DOCUMENT RESUME

ED 340 902 CE 060 081

AUTHOR	Hofstrand, Richard K.; Bedwell, Robin E.
TITLE	GENTEC--Phase II: A Curriculum and Instructional Materials on Topics of Generic Technology. Volume I: Final Report. Volume II: Instructional Modules.
INSTITUTION	Eastern Illinois Univ., Charleston.
SPONS AGENCY	Illinois State Board of Education, Springfield. Dept. of Adult, Vocational and Technical Education.
PUB DATE	Jul 88
NOTE	262p.
PUB TYPE	Guides - Classroom Use - Teaching Guides (For Teacher) (052) -- Reports - Descriptive (141)
EDRS PRICE	MF01/PC11 Plus Postage.
DESCRIPTORS	*Behavioral Objectives; Competency Based Education; Curriculum Development; Employment Potential; Evaluative Thinking; High Schools; Independent Study; Individualized Instruction; Instructional Materials; *Job Skills; Job Training; Learning Activities; *Learning Modules; Material Development; Postsecondary Education; *Problem Solving; *Productivity; Self Evaluation (Individuals); Teaching Guides; *Teamwork; Technical Education; Work Attitudes
IDENTIFIERS	*Generic Technical Competencies

ABSTRACT

These volumes describe and contain products of Project GENTEC, which identified and defined 29 generic technical (GENTEC) competencies. (A GENTEC competency is an idea or structure of ideas that contributes to the production and/or distribution of goods and/or services and that involves worker behaviors, including critical thinking, emotions, and actions.) Volume I describes preparation of student-based instructional modules and accompanying teacher's addenda on four GENTEC concepts, field testing, and product dissemination. Other contents include information on GENTEC, definitions of terms, and descriptor sheets of 29 GENTEC competencies, which provide an example, definition, rationale, intended learner outcomes, and resources/references. Volume II contains instructional modules, each with a teacher's addendum, on these GENTEC competencies: technical teamwork, technical problem solving, productivity, and technical judgment. Each instructional module contains the following: an introduction; intended learner outcomes; a list of key questions to which the subsequent pages provide answers, including terms commonly associated with the competency; a list of references; and listing of recommended resources. The teacher's addendum provides an overview of GENTEC, definition and example of the competency, intended learner outcomes, resources/references list, additional instructional activities, student evaluation instrument(s), answer keys, and additional instructional resources. (YLB)

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FINAL REPORT

GENTEC - PHASE II:
A CURRICULUM AND INSTRUCTIONAL MATERIALS ON TOPICS OF GENERIC TECHNOLOGY

VOLUME I : FINAL REPORT
VOLUME II : INSTRUCTIONAL MODULES

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Supported in part by the Illinois State Board of Education
Department of Adult, Vocational and Technical Education

July, 1988

Adult &
Continuing
Education

CE 060081

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PROJECT GENTEC

Overview

Project GENTEC began in FY1987 as a Form B activity within Eastern Illinois University's Plan for Education for Employment. During that year, several generic concepts were identified and defined together with the drafting of one student-based instructional module on TECHNICAL JUDGMENT.

During the current FY1988 year, the project was funded as a sub-contract through Illinois State University. During this year, several objectives were accomplished, including the following:

1. Additional concepts of higher level occupational knowledge, attitudes and psychomotor skills were identified and defined.

2. A concept descriptor sheet was prepared for each concept. To date, 29 concepts have been identified. These concepts are shown on page 11 in Volume I of this report.

3. Three student instructional modules and accompanying teacher's addendums were prepared on three GENTEC concepts. They include:

TECHNICAL TEAMWORK,
TECHNICAL PROBLEM SOLVING and
PRODUCTIVITY

and are included in Volume II as Appendices A through F, respectively. Field testing was conducted at various community colleges, an area vocational center and a manufacturing plant, all in Illinois. Two additional technical consultants were employed to advise and assist in the design and development of two GENTEC modules.

4. Efforts and activities were coordinated with the Illinois Plan for Education Project.

5. GENTEC products were disseminated. The dissemination plan is detailed on pages 3-4 in Volume I of this report.

6. Also during FY1988, the opinions were sought of vocational educators regarding their perceptions of GENTEC and the GENTEC concepts. Over 80 professionals were asked to rank the GENTEC concepts at three dissemination activities. These included:

*American Technical Education Conference

*Illinois Vocational Association Conference

*Lake County Area Vocational Center

The results of their input are shown on pages 5, 6 and 7 of Volume I of this report. This indicates educators' broad-based support of GENTEC and their feelings about the rank ordering of GENTEC concepts.

The Dissemination Planning Outline for FY1988 is shown below:

Dissemination Goal	Outcomes	Dissemination Activities	Target Audience	Followup
Awareness of Project GENTEC	Enthusiasm and interest	Presentation	Members of IVEPDA, Springfield, Illinois 4/2/87	*Add interested persons to network *Obtain feedback *Dissemination of report
Awareness of Project GENTEC	Enthusiasm and interest	Presentation	Planning Grant Directors Mtg., Peoria, Illinois 5/6/87	*Add interested persons to network *Obtain feedback *Dissemination of report
Awareness of Project GENTEC	Enthusiasm and interest	Presentation	Members of IIEA, IIEA Conf., Decatur, Illinois 10/9/87	*Add interested persons to network *Obtain feedback *Dissemination of report
Awareness of importance of teaching higher order thinking skills	Enthusiasm and interest	Presentation	Instructors at Lake Co. Area Voc. Center, Grayslake, Illinois 1/25/88	*Add interested persons to network *Obtain feedback *Dissemination of report
Awareness of Project GENTEC	Enthusiasm and interest	Article for publication in Fall 1987 Newsletter	Vocational Educators nationwide	*Add interested persons to network *Obtain feedback *Dissemination of report
Obtain field test site	Obtain feedback from students and instructors after field testing	Presentation	Instructors at Olney Central College, Olney, Illinois 3/17/88	*Add interested persons to network *Dissemination of report

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Dissemination Goal	Outcomes	Dissemination Activities	Target Audience	Followup
Awareness of Project GENTEC	Enthusiasm and interest	Presentation	Members of ATEA, ATEA Nat. Conference Nashville, Tennessee 3/27/88	*Add interested persons to network *Obtain feedback *Dissemination of report
Awareness of importance of teaching higher order thinking skills	Enthusiasm and interest	Presentation	Instructors from a six county area (Litchfield Illinois)	*Add interested persons to network *Obtain feedback *Dissemination of report
Field test	Obtain feedback from instructors and students after field testing	Instructors field tested TECHNICAL DECISION MAKING module	Olney Central College Olney, Illinois 1/88	*Obtain feedback from instructors and students for module revision
Field test	Obtain feedback from employees after field testing	Field tested for five days during the employee's lunch hours	Employees at Roadmaster Corp., Olney, Illinois	*Obtain feedback from employees for module revision and allow employees to participate in an Employee Development Program
Field test	Obtain feedback from instructors and students after field testing	Instructors field tested PRODUCTIVITY module	Lake Co. Area Voc. Center, Grayslake, Illinois 1/88	*Obtain feedback from instructors and students for module revision

To date, eleven presentations have been made to over 200 participants including vocational teachers, technical trainers, curriculum developers and adult laborers.

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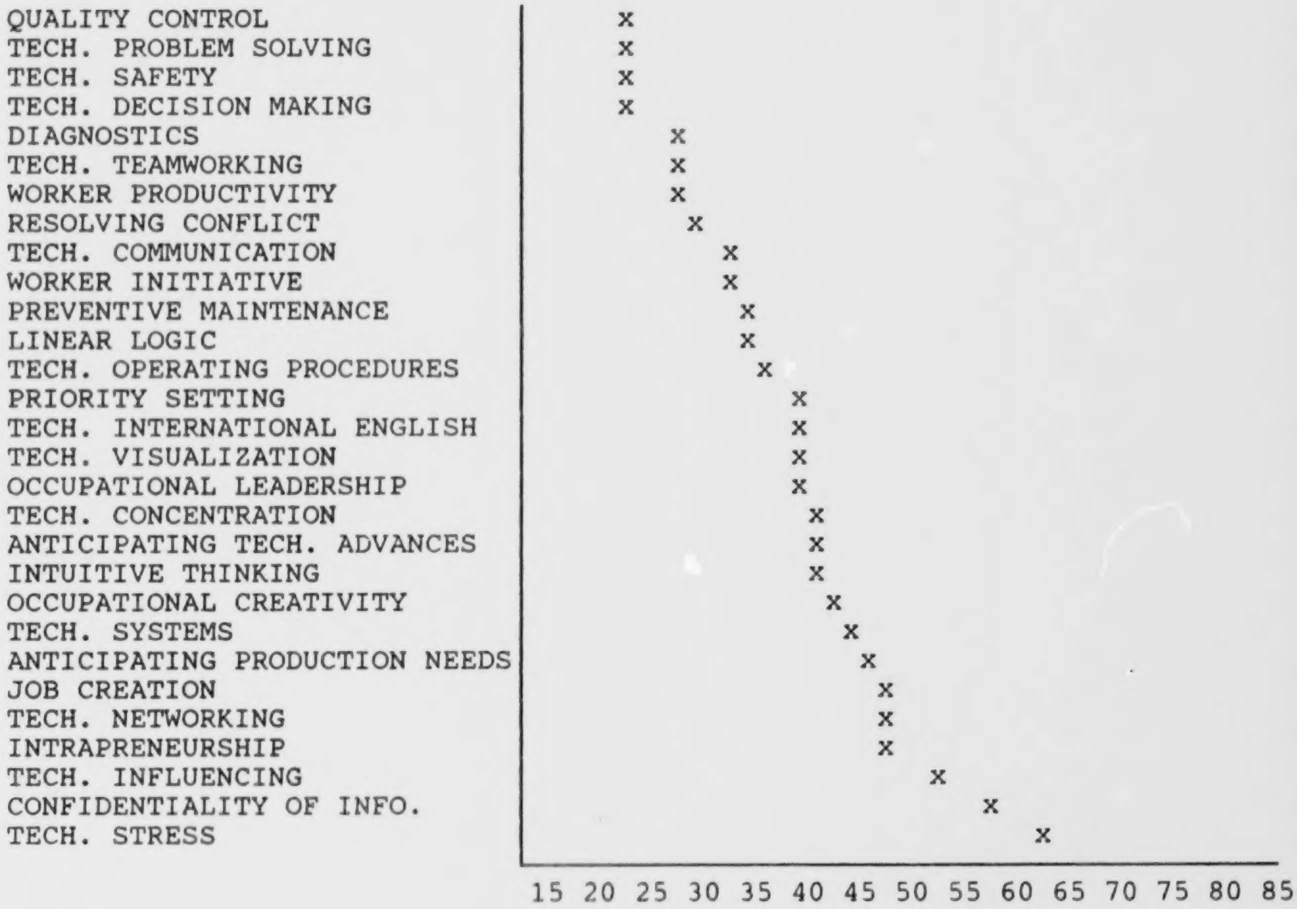
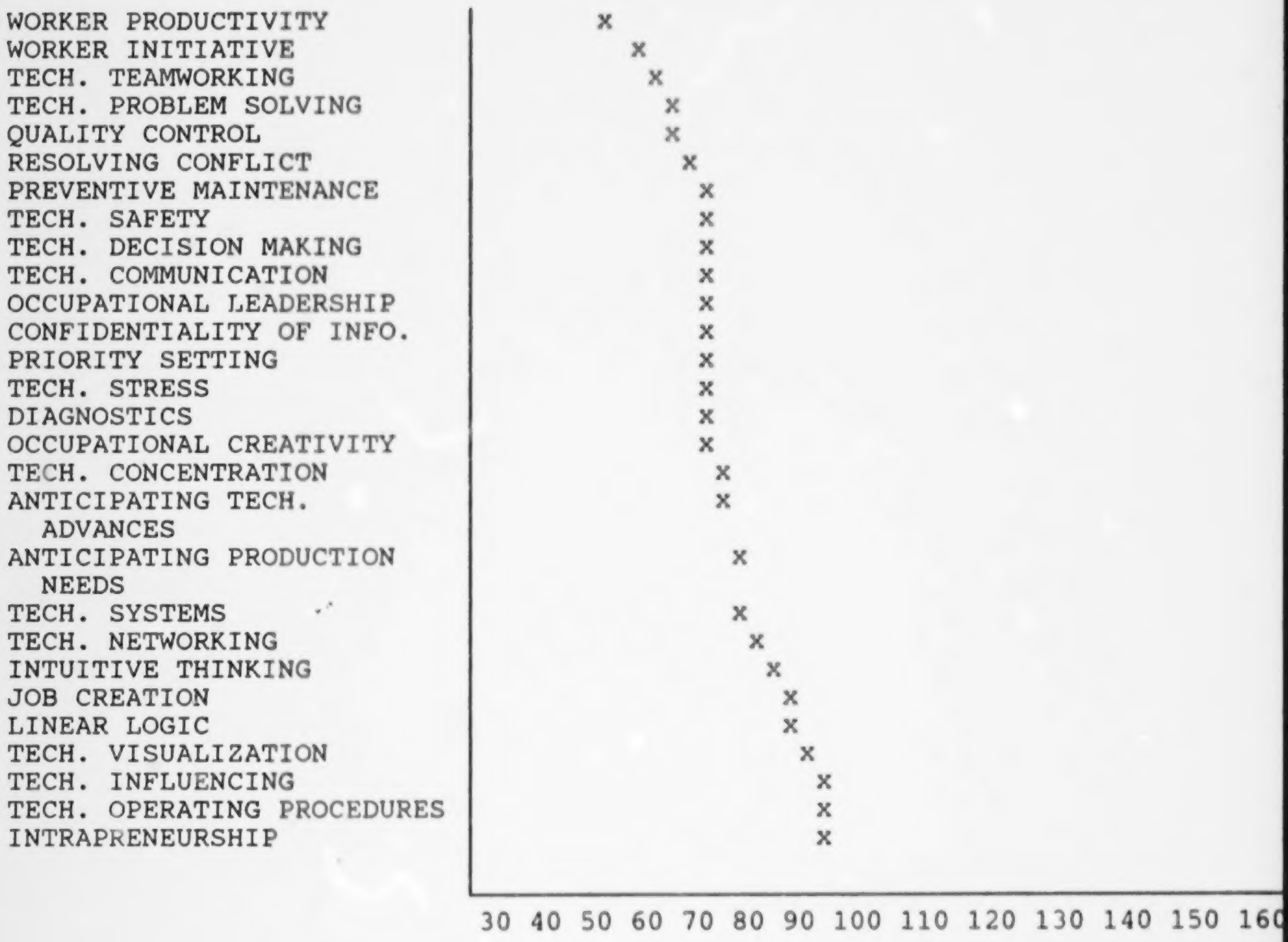
RANKING OF GENTEC COMPETENCIES BY 17 ATEA* SESSION ATTENDEES
(RANGE 17-85)



*American Technical Education Association, 3/27/88, Nashville, TN

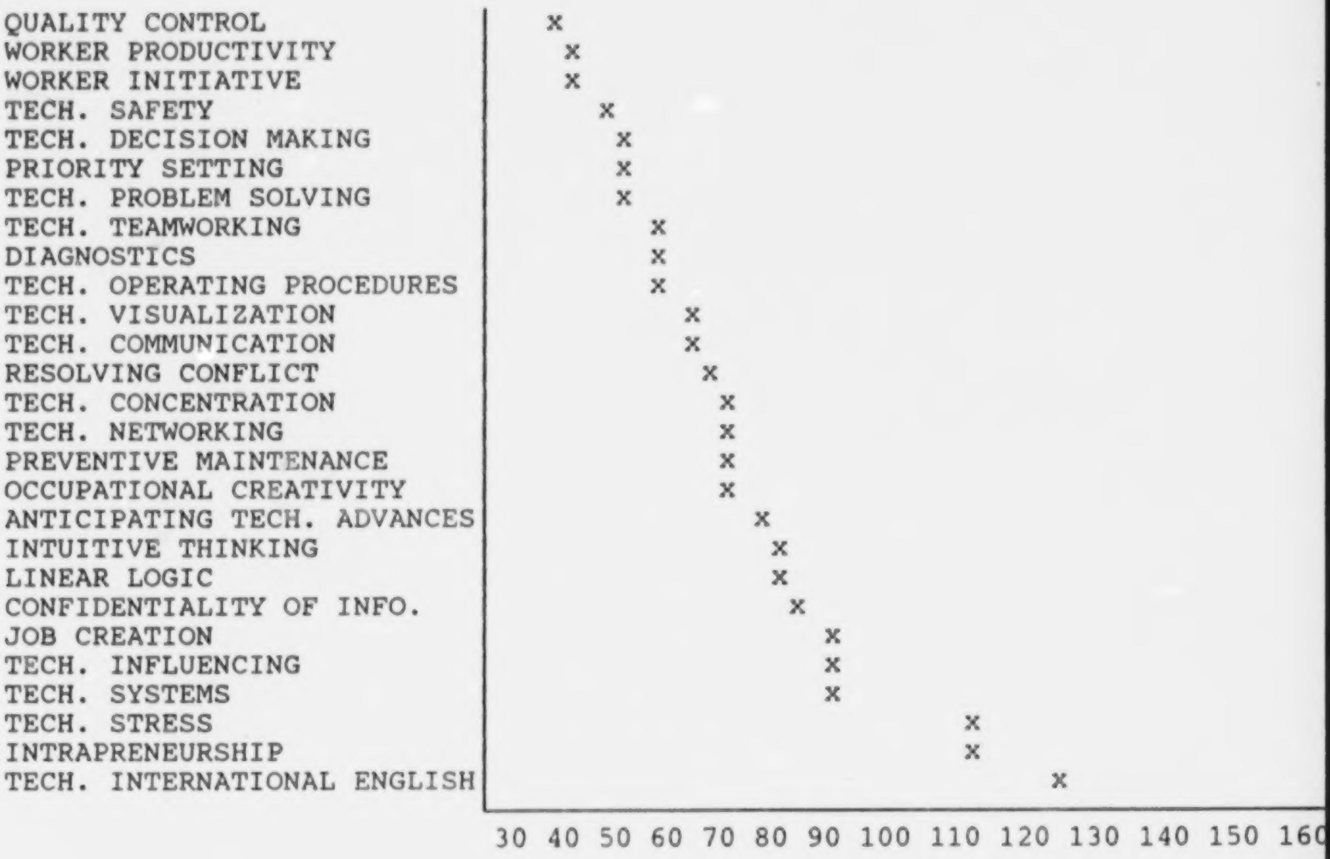
GENTEC/ate-graph

RANKING OF GENTEC COMPETENCIES BY 33 IVA* SESSION ATTENDEES
(RANGE 33 TO 165)



*Illinois Vocational Association, 2/18/88, Itasca, IL

RANKING OF GENTEC COMPETENCIES BY 33 INSTRUCTORS AT LAKE COUNTY AREA VOCATIONAL CENTER*
(RANGE 33 TO 165)



*Presented at an Instructor In-service, Lake County Area Vocational Center, 1/25/88, Grayslake, IL

GENTEC/lcavc-graph

REPRINT FROM: 1. What is GENTEC? (article reprint)

VIM

NEWSLETTER FALL 1987

Generic Competencies Address Unique Needs

By Dr. Richard K. Hofstrand
and Ms. Robin E. Bedwell

"We need 800 employees trained" -- not an unusual request for the Illinois State Board of Education (ISBE). But what this company wanted its employees to be trained in was unusual.

The firm approached ISBE for financial and programmatic assistance in training its 800-member staff. Plant management requested training in generalized staff competencies such as :

- Quality control -- each plant employee trained in the procedures of quality control.
- Diagnostics -- each member trained to diagnose problems in the computer-controlled and robotized assembly line.
- Technical report writing -- employees trained to prepare training materials and manuals for other robotized assembly lines.
- Quality circles -- implemented by employees throughout the plant to improve production quality and quantity of the product produced.

The plant management was not looking for a specialized staff with specialized skills. Instead, they were looking for a generalized staff with advanced knowledge, specialized skills and prescribed attitudes which were common to all employees.

The Illinois State Board of Education contracted with occupational education specialists at Eastern Illinois University, Charleston, to develop a curriculum of generic technical competencies and instructional materials which could be used by high schools, community colleges, technical institutes or ir plant technical training programs. These were to become known as generic technical competencies or GENTEC.

GENTEC competencies, which involve critical thinking, sophisticated behaviors and professional attitudes, are applicable to the five occupational clusters -- agriculture, business, health, home economics and industrially-related occupations.

A GENTEC competency is a top (idea or structure of ideas) which contributes to the production and/or distribution of goods and/or services and which involves advanced worker behaviors including higher level thoughts, feelings and actions.

Each competency is judged against a set of tenets to ensure that the competency is generic and technical and:

- Contributes to the production and distribution of goods and services.
- Improves the efficiency and/or effectiveness of on-the-job performance.
- Has a unique body of knowledge including nomenclature/vocabulary with denotations.
- Builds on basic (generalizable) skills.
- Builds on occupational skills.
- Is at higher levels on the hierarchies of the three learning domains (affective, cognitive, psychomotor).
- Often demands defined and precise physical behavior.
- Requires instruction for understanding and application (it cannot be learned by direct experience, only through vicarious experience).
- Requires mental concentration for execution (a mindful process).
- Is focused on mental rather than physical processes.
- Is "people-centered" and "information-centered" rather than "thing-centered".
- Involves prescribed demeanor (a positive emotional behavior).
- Is applicable to most clusters of technical occupations.
- Is transferable to a variety of occupational settings.
- Is contributory to job enhancement.
- Is contributory to job advancement in a career.
- Is considered a desirable competency of employees by employers.

The instructional modules, which are student-based with an instructor's addendum, will be prepared for each GENTEC concept. The instructional module contains learning aides such as, competency portrayals, key questions with answers, audio tapes, videotapes, simulation, and computer software.

VIM Newsletter is published by:
East Central Network Center/Il. Voc. Curr. Cen
Sangamon State University, Springfield, IL.

2. WHY IS GENTEC IMPORTANT?

In today's market of competitive hiring, the prospective employee with the best preparation will get and keep the job. But the best technical preparation is not always measured by occupational proficiency. Certain generic technical competencies are becoming increasingly important. Most technical educators and occupational trainers will concur that program completers with knowledge, skills and attitudes in generic technical competencies are better prepared to enter and progress within a desired occupation.

3. WHAT IS A GENTEC COMPETENCY, AND ARE ALL APPLICABLE TO ALL OCCUPATIONAL AREAS?

A GENTEC competency is an idea or structure of ideas which contributes to the production and/or distribution of goods and/or services and which involves worker behaviors including critical thinking, emotions and actions.

GENTEC competencies are equally applicable to all areas of agriculture, business, health, home economics and industrial occupations.

4. WHAT CRITERIA ARE USED FOR INCLUDING COMPETENCIES IN THE GENTEC CURRICULUM?

Each GENTEC competency fulfills a set of tenets which are used as criteria to determine if a particular competency is to be included in the GENTEC curriculum. These tenets are as follows:

Each GENTEC competency:

1. contributes to the production and distribution of goods and services,
2. improves the efficiency and/or effectiveness of on-the-job performance,
3. has a unique body of knowledge including nomenclature/vocabulary with denotations,
4. builds on basic (generalizable) skills,
5. is contributory to lifelong learning, as opposed to only "learning for the moment or situation,"
6. builds on occupational skills,
7. is at higher levels on the hierarchies of the three domains of learning,

8. often demands defined and precise physical behavior,

9. requires instruction for understanding and application, (it cannot be learned by direct experience, only through vicarious experience),

10. requires mental concentration for execution (a "mindful" process),

11. is focused on mental rather than physical processes,

12. is "people-centered" and "information-centered" rather than "thing-centered,"

13. involves prescribed demeanor (a positive emotional behavior),

14. is applicable to all clusters of technical occupations,

15. is transferable to a variety of occupational settings,

16. is contributory to job enhancement,

17. is contributory to job advancement in a career and

18. is considered a desirable competency of employees by employers.

5. HOW ARE GENTEC COMPETENCIES BEING IDENTIFIED?

GENTEC competencies are identified and clarified by observing what business and industry does. This is accomplished by monitoring publications of business and industry, not just educational publications.

These sources include:

Association for Supervision and Curriculum Development

Business Japan

Chanute Air Force Base

Chicago Tribune

Fortune

Future Survey

highTechnology

Issues & Observations

Pryor Report

School Shop

School of Technical Careers Journal

Science Digest

Technological Forecasting & Social Change

Training

Training and Development Journal

Training and Instruction Update

Wall Street Journal

6. WHAT ARE THE GENTEC COMPETENCIES?

The following competencies have been identified for inclusion in GENTEC. As each competency is clarified, some competencies may be deleted, while others may be added. The competencies, to date, are as follows:

Diagnostics - the analysis of relevant data and prescription of remedial action to correct system malfunctions.

Technical Networking - the formation and use of interdependent relationships to facilitate technical competence and proficiency.

Preventive Maintenance - the identification and performance of routine precautions to keep occupational facilities and equipment operating at design performance.

Technical Teamwork - the working with others cooperatively by sharing talent in an efficient manner toward a common goal.

Technical Judgment - the selection of a best alternative from a variety of courses of action to reach desired objective(s).

Occupational Creativity/Innovation - the envisioning of alternative occupational processes and/or products which are more efficient and/or effective.

Worker Productivity - the process of and formation of a positive attitude towards increasing one's own job output.

Technical Problem Solving - the process of creating change to bring extant conditions closer to desired conditions.

Technical Systems - the use of alpha-numeric and other systems to organize, classify and retrieve technical information.

Technical Visualization - the mental process of representing abstract thoughts with graphic symbols and to reconfigure symbols in differing spatial relationships.

Confidentiality of Information - the ability to maintain security on trade secrets, design concepts, data and other information which, if released, would undermine the economic success of the entity which initially generated the information.

Technical Communication - the efficient and effective exchange of information between technicians using nomenclature, terms, acronyms and jargon.

Quality Control - the process and concomitant process of maintaining or exceeding levels or standards of accuracy and precision.

Technical Safety - the development of attitudes, knowledges and skills conducive to a safe work environment.

Priority Setting/Time Allocation - the sequencing of occupational obligations/assignments to maximize the use of available time and energy.

Technical Influencing/Persuasion/Negotiation - the enhancing of one's status to affect policy, procedure or product decisions.

Anticipating Technological Advances/Self Re-training - the learning of new skills and/or procedures or transferring extant competencies to new occupational settings in order to stay abreast of technological changes.

Intuitive Thinking - the use of one's "gut level" feelings or hunches as an additional source of input or data.

Technical Stress - the malady of adaptation caused by an inability to cope with new technologies in a productive manner.

Occupational Leadership - the enactment of behaviors to coordinate the efforts of others to reach a common goal.

Technical Operating Procedures - the written or oral instructions given to technicians as a method of ensuring/improving job performance.

Job Creation - the ability to initiate new ideas, new jobs and becoming entrepreneurs by thinking about one's own talents, skills, interests and capacities for productive involvement in a work setting.

Worker Initiative - the desire to begin and to exert additional effort in accomplishing occupational tasks and goals; "going the extra mile."

Technical International English - the ability to read, speak and write a core of English vocabulary to communicate technical information internationally.

Linear Logic - the ability to sequence thinking based on time frames, stages of completion or need criteria.

Resolving Conflict - the use of effective strategies of settling situations because of unclear definition of individual roles and responsibilities.

Intrapreneurship - the use of entrepreneurial talent inside organizations.

Technical Concentration - the ability to focus one's attention on immediate tasks; to screen distractions.

Anticipating Production Needs - assuming the responsibility for ensuring the availability of materials and machines for continued production.

7. WHAT IS A DESCRIPTOR SHEET?

To assist in defining and clarifying GENTEC competencies, a descriptor sheet has been prepared for each. Descriptor sheets for each of the GENTEC competencies begin on page 11 of Volume I of this report. An actual descriptor sheet follows:

GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Diagnostics

EXAMPLE:
As you are driving down the highway, your car's engine dies. You roll to a stop at the edge of the pavement. Fortunately, a gas station with a mechanic on duty is located directly across the street. The auto mechanic follows you toward your car to help with your dilemma. As she opens the hood, you have visions of gnarled metal parts, time consuming delays and an expensive bill. Within a few moments, the mechanic has diagnosed your problem; you have run out of gas. But she also alerts you that your air filter is dirty and that the ventura of your carburetor indicates signs of a rich fuel-air mixture signalling a need for carburetor adjustment.

DEFINITION:
Diagnostics is the ability to remedy technical problems through an analysis of relevant data and prescribing remedial action.

Diagnostics differs from traditional problem solving in that with problem solving, a variety of plausible solutions exist, some being better than others, but that a variety of solutions would solve the problem. In diagnostics, however, the problem lies within a technical function (electrical, mechanical, biological, and/or human system) in which only one precise solution can remedy the problem.

RATIONALE:

The ability to diagnose medical problems is a key competence of the medical profession. Physicians spend considerable time in their professional training analyzing the cause-effect relationships of non-healthy situations. So also, it is increasingly imperative that technicians in all occupational areas understand the competency and be able to perform the steps in performing diagnostics. Competence in diagnostics prepares workers to improve the speed and precision of diagnosis.

INTENDED LEARNER OUTCOMES:

A learner who has mastered this competency will be able to:

1. Describe the competency of diagnostics.
2. Recite the steps in performing a diagnosis.
3. Define the contectual information/data important to a particular diagnosis.
4. Generate three or more plausible causes of a problem.
5. Arrange those causes in descending order from most probable to least probable and prescribe and/or perform remedial action.

RESOURCES/REFERENCES (listed in order from best to least-best for instructional purposes):

Meyers, Chet. (1985). _Teaching Students to Think Critically, A Guide for Faculty in All Disciplines_. San Francisco: Jossey-Bass Inc.

Sternberg, Robert J. (1985, November). Teaching Critical Thinking, Part 1: Are We Making Critical Mistakes? _Phi Delta Kappan_, pp. 194-198.

Condon, Mary. (1985, March). How Do You Teach Managers to Think? _Training and Development Journal_, pp. 16-22.

Settle, Mary. (1985, March). Diagnostics First. _Training and Development Journal_, pp. 8-10.

"Brain Building: Easy Games to Develop Your Skills", Shamrock Press, Div. of Karl Albrecht & Assoc., 1277 Garnet Avenue, San Diego, CA 92109 (619) 272-3880.

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*1986. For more information contact Dr. Richard K. Hofstrand, Ph.D. Eastern Ill. University, Charleston, IL 61920; 217-581-3912.

GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Quality Assurance

EXAMPLE:
Lindsey B. shares some of her thoughts concerning quality assurance.

"When I took this job five years ago, fresh out of a community college's secretarial program, I knew what quality assurance was, but didn't think that I, as a secretary, should be concerned with it. To me, quality assurance applied to employees who produced a product, like makeup or cars. I learned differently on my very first day of work.

I learned that I produce products, too. Business letters are my products. My supervisor explained to me that a letter is often the first impression that other individuals or companies receive of us. First impressions are important.

My supervisor outlined the quality assurance standards for a business letter. First, I read the typed letter back for content. Does it correctly relay (right word?) the original intent that my supervisor wanted? Does it include all the main points that were intended? Second, I read for language and terms. There are certain terms and languages that our company uses that others don't. Third, I read for accuracy. Typos and grammatical errors are checked this time. These are just as important as the others.

I understand how important it is to follow the standards that are outlined in the quality assurance program in my department. Computers make it easy to correct errors, but that doesn't give me permission to slack off in terms of doing my part in quality assurance."

DEFINITION:
Quality assurance is maintaining standards of accuracy in any occupational setting.

RATIONALE:

Most will agree that success in today's competetive economy requires a strong position concerning quality. As an employee in any organization, you should be concerned with taking pride in your work by doing your job right the first time. Preventing defects by building quality into anyone's job is important now more than ever.

There is an increasing emphasis on product reliability by consumers as well as management for obvious reasons. Because of this emphasis, consumers are demanding better, more economical products. Consumers seek the proven performer. They don't want defective products. The value of an individual's free time increases every day. Who wants to buy a tackle box for a big fishing trip only to have it break the minute they are in the boat in the middle of the lake?

INTENDED LEARNER OUTCOME:
A learner who has mastered this competency will be able to:

1. Explain the concept of quality assurance and the importance of a carefully maintained program to an organization.
2. Describe several examples of quality assurance in an occupational setting.
3. Define efficiency standards and defend the need for them in a quality assurance program.
4. Discuss the importance of management support in a quality assurance program.
5. Define the terms commonly associated with quality assurance.

RESOURCES/REFERENCES (Listed in order from best to least best):

Smith, Martin R. (1979). Quality Sense. New York: AMACOM.

Groocock, J. M. (1974). The Cost of Quality. Toronto: The Copp Clark Publishing Company.

Guaspari, John. (1985). I know it when I see it. New York: AMACOM.

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*1986. For more information contact Dr. Richard K. Hofstrand,Ph.D. Eastern Ill. University, Charleston, IL 61920; 217-581-3912.

DEVELOPMENTAL DRAFT
For discussion purposes only

GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Linear Logic

EXAMPLE:

Any plumber will tell you that the worst time to add plumbing to a new home is after construction is finished. In contrast, the best time to add plumbing to a new home is while the new home is still, under construction and the plumber has access to the interior cavities of walls and floors. To add plumbing after the home is finished requires cutting holes in the finished walls, floors and ceilings in order to gain access to those interior cavities. In other words, there is a logical and an illogical stage of construction in which new plumbing can be added to a new home.

DEFINITION:

Linear logic is being able to think in a linear and a logical manner; it is the skill to sequence thoughts according to a desired criterion such as priority, time, or desire.

RATIONALE:

In the example above, it is to the builders' benefit to sequence the stages of construction of a structure so that that particular aspect of construction may be performed the quickest and easiest possible. It is obviously illogical to schedule the roofers to come before the foundation is even laid. Technicians need to be able to subdivide a large project or task into subprojects and be able to logically sequence those subparts or subtasks into logical steps based on some criteria, such as time, stage of completion, or other criteria.

INTENDED LEARNER OUTCOMES:

A learner who has mastered this competency will be able to:

1. Describe the concept of linear logic.

2. Use all bases of criteria for logical progression.

3. Subdivide larger projects into subtasks and sequence those subparts in a logical order.

4. Cite three examples of the use of linear logic in that learner's occupation.

RESOURCES/REFERENCES (Listed in order from best to least best for instructional purposes):

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*1987. For more information contact Richard K. Hofstrand, Ph.D. Eastern Ill. University, Charleston, IL 61920; 217-581-3912.

GENTEC/logic

GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Technical Systems

EXAMPLE:

I had joined a friend who wanted to get an atlas from our local library. As we entered the large, open stack area, we scanned the numbering system which hung above each row of books. He then headed straight for the stack numbered YYY. Hurrying behind him, I asked if he didn't want to look through the card catalog to find where they kept the atlases. He replied that the the atlases would be in the YYY section because this library used the Dewey Decimal System and of the 10 major categories in that system, YYY includes geography and therefore atlases. He continued by saying that if a library had been organized using the Library of Congress system, atlases would have been found in the section numbered XXX.

By the time I would have found the card catalog, he had already located his atlas. It was obvious that he knew enough about the systems for classifying knowledge to make better use of his time.

DEFINITION:

Technical systems is the use of alpha-numeric and other systems to organize, classify and retrieve technical information.

RATIONALE:

Since Guttenberg revolutionized the information age with his movable type in the mid-1800s, the amount of knowledge available has been increasing at an increasing rate. As information and technology advanced, a need was soon apparent for the establishment of a system of classifying knowledge.

Other systems have concomitantly emerged: classification systems for flora and fauna, the Metric System of measurement is slowly replacing the English System, standardization of metallic fasteners by the American Society of Automotive Engineers, systems for sequencing the logic of computer systems, even down to the nation-wide numbering system of interstate highways. What has evolved technologically is a "system of systems." Technicians need to understand and utilize not only skill-level systems essential to their particular technical field, but also the systems common to all of us.

INTENDED LEARNER OUTCOME:

A learner who has mastered this competency will be able to:

1. Define a "system."

2. Describe the essential elements of three or more systems.

3. Utilize at least one system efficiently and accurately..

RESOURCES/REFERENCES (listed in descending order from best to least best for instructional purposes):

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*1986. For more information contact Dr. Richard K. Hofstrand,Ph.D. Eastern Ill. University, Charleston, IL 61920; 217-581-3912.

DEVELOPMENTAL DRAFT
For discussion purposes only

GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Technical Visualization

EXAMPLE:

At a staff meeting, the president of a small company was describing the new roles and responsibilities of different staff members. The long-winded oral discourse included who was to be reporting to whom? For what? Why? When? People quickly became confused.

To be of assistance in resolving the confusion, one of the junior staff members began to draw boxes and lines on a sheet of paper. He put a single box at the top of the page and labelled that box "president." Beneath that, he drew three more boxes which represented three vice presidents. Soon, an "administrative structure" emerged from the visualization. Because of it, all concerned could now "see" the interdependence of roles and responsibilities.

DEFINITION:

Technical visualization is the mental process of representing abstract thoughts with graphic symbols and reconfiguring symbols in differing spatial relationships.

RATIONALE:

Psychologists have long known that we think with our senses. For example, a carpenter can "see" a house in his mind's eye before he builds it. An interior decorator can "see" the colors, shapes, textures and emotional effect of a room being designed. An auto mechanic can "hear" the sound of a malfunctioning engine component. A chef can "taste" the blending of spices during preparation of the food. A laboratory technician can "smell" the chemicals common in the laboratory. A data entry clerk can "feel" when he has made a data entry error. The senses of a visualization, auditory, tasting, kinesthetic and olfactory are critical to the way that a technician performs his or her job but also to the way they "think" in performing those tasks. Being able to visualize, especially of abstractions, is important to the technician's effectiveness and efficiency.

INTENDED LEARNER OUTCOME:

A learner who has mastered this competency will be able to:

1. Define the competency.

2. Describe its use in varying occupational contexts.

3. Prepare a rough sketch of a visualization within an occupational setting.

RESOURCES/REFERENCES (listed in order from best to least best for instructional purposes):

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*1986. For more information contact Dr. Richard K. Hofstrand, Ph.D. Eastern Ill. University, Charleston, IL 61920; 217-581-3912.

GENTEC/visual

GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Technical International English

EXAMPLE:

CATERPILLAR Co. sells equipment around the world. Sometimes that equipment breaks down and must be repaired. To prepare technical repair manuals in every language where CATERPILLAR equipment is used would be horrendous. As a result, CATERPILLAR developed a "fundamental English" of 800 words, each with a specific meaning. All repair manuals are written in this CATERPILLAR Fundamental English. Each manual, when combined with a technical "picture book" for each particular machine allows any skilled mechanic speaking any native language in the world to repair the machine.

DEFINITION:

Technical International English refers to a core of English vocabulary to assist in communicating international technical information clearly and accurately.

RATIONALE:

The rate at which technical information is generated around the world is increasing at an increasing rate. It is not uncommon to hear of surgeons sharing information from one country to another while in the operating room. With the ballooning of technical information, the need increases geometrically to be able to communicate, and to reduce obfuscation, through a "technical international English."

This need to communicate is a result of standardization of technical terminology and instructions, the avoidance of "foggy" instruction that could lead to product and/or service liability, and the controlled vocabulary for artificial intelligence, CAD/CAM and robotics.

INTENDED LEARNER OUTCOMES:

A learner who has mastered this concept will be able to:

1. Understand the concept of, and appreciate the need for, effective and efficient communications with other languages.

2. Argue the contextual and theoretical bases of differing "international languages."

3. Communicate orally and in writing using a technical international English.

RESOURCES/REFERENCES (Listed in order from best to least best for instructional purposes):

Caterpillar Tractor Company. (1972). Caterpillar Fundamental English. Peoria.

Sloane, E.H. Fundamental English. (1961). Annapolis: Owl Press.

Lewis, M., & Lyman, D. Essential English. (1981). Santa Monica: Goodyear Publishing Company.

Gucker, P. Essential English Grammar. (1966). New York: Dover Publications.

How to Avoid Sexism. Lawrence Ragan Communications. (1978).

Ogden, C. K. Basic English: International Second Language. (1968). New York: Harcourt, Brace and World, Inc.

Jarmul, David. Plain Talk - Clear Communication for International Development. (1981). Mt. Rainier: Volunteers in Technical Assistance.

WordBase. A vocabulary for writing technical instructions in clear language. Smart Communications, Inc. 655 Third Avenue, Penthouse, New York, NY 10017, (212) 486-1894.

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*1987. For more information contact Richard K. Hofstrand, Ph.D. Eastern Ill. University, Charleston, IL 61920; 217-581-3912.

GENTEC/tie

DEVELOPMENTAL DRAFT
For discussion purposes only

GENTEC: GENERIC TECHNOLOGICAL COMPETENCY*

COMPETENCY: Anticipating Technological Advances

EXAMPLE:

The Illinois Consolidated Telephone Company is one of the most technologically advanced in the nation, having led some of the research on fiber optics. The tele-communications technicians that work for ICTC are highly competent, loyal to the company and stable, with the youngest seniority in many departments being over 10 years. When asked how they keep up-to-date technologically, they responded that they learn just enough of new technology to get by. New technology which replaces the former comes along so frequently that anyone who masters any "wave" of technology is simply wasting their time. A new wave of technology will replace the former making the former obsolete. So why learn something that is going to become obsolete quickly - just learn enough to get by now. (ICTC, 1986).

DEFINITION:

Anticipating technological advances refers to learning new skills and/or procedures or transferring extant competencies to new occupational settings in order to stay abreast of technological changes.

RATIONALE:

Being able to anticipate and accept the responsibility for one's own learning is the first step towards becoming a more adaptable employee of the future. Those employees that are unable to re-learn will be eliminated from technological advancement.

An adaptable technician is one that is receptive to change and is willing to transfer previously learned skills to new situations. This adaptable employee will find that they are more employable if they are willing to re-train. Those that are unable or refuse to re-learn will find it difficult to advance or possibly retain their employment situation.

INTENDED LEARNER OUTCOME:

A learner who has mastered this competency will be able to:

1. Defend the concept of anticipating technological advances.

2. Demonstrate acceptance of the responsibility for re-training.

RESOURCES/REFERENCES (listed in order from best to least best for instructional purposes):

Hoos, Ida Russakoff. (1967). *Retraining The Work Force: An Analysis of Current Experience*. Berkeley, University of California Press.

Wolfkein, Seymour Louis. (1967). *Education and Training for Full Employment*. New York: Columbia University Press.

Staff. (1985, October). Retraining called for in education. *Automotive News*, pp. 38-40.

Morano, R. A., & Deets, N. (1985, May). Professional Retraining: Meeting the Technological Challenge. *Training and Development Journal*, pp. 99-100.

Fudge, C. (1986, February). Retraining for new technology: six success stories. *Personnel Management*, pp. 42-45.

Illinois Consolidated Telephone Company. Observations by P. Eckerty during a Vocational Instructor Practicum Internship, Summer 1986.

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*1986. For more information contact Dr. Richard K. Hofstrand,Ph.D. Eastern Ill. University, Charleston, IL 61920; 217-581-3912.

GENTEC/techadv

DEVELOPMENTAL DRAFT
For discussion purposes only

GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Anticipating Production/Service Needs

EXAMPLE:

Several single family homes were under construction in a remote subdivision. To speed construction, two shifts of crews were scheduled to speed production. The shingling crews were using air hammers to nail the shingles to the roof sheeting. The air hammer used a special nail arranged in a "carrier". The crew on the second shift nearly depleted the supply of special nails. They failed to inform anyone of the shortage of shingling nails. Next morning, the first shift quickly ran out of nails halting production. The guttering and painting crews scheduled for 2nd shift showed up but had to be sent back. Production was halted and expensive employee time was wasted due to lack of anticipating production needs.

DEFINITION:

Anticipating production/service needs is assuming responsibility to ensure that adequate supplies of materials, the proper equipment and that the most current information is available to the next technician(s) for the continuation of production and/or service.

RATIONALE:

The story is oft told of an army of soldiers and heavy artillery were to advance and engage in battle. But a small, vital pin for the General's jeep could not be located. After much searching, a pin was located. But the advance had been delayed too long. The battle was lost. All because of a $1 pin.

Too often technicians are unable to "get right to work" because adequate supplies, equipment or information is not mailable, largely because it was not anticipated by the prior technician in that work station. First line supervisors and managment attempt to anticipate such stymied production or service, but the technician(s) know firsthand what the following workers will need.

INTENDED LEARNER OUTCOMES:

A learner who has mastered this competency will be able to:

1. Describe the concept of anticipating production/service needs.

2. List 3 or more reasons why this concept is important and to whom (such as safety to the employee, profit to the employer, hourly wages to fellow employees, service to the client).

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*1987. For more information contact Richard K. Hofstrand, Ph.D. Eastern Ill. University, Charleston, IL 61920; 217-581-3912.

3. Recite a sequencial listing of the materials, machines and information/data which are of critical importance to the learner's occupation.

4. Inform sources of supplies, and the next shift, as to information, materials and machines needed.

RESOURCES/REFERENCES (Listed in order from best to least best for instructional purposes):

GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Intuitive Thinking

EXAMPLE:

A state police officer had the task of serving a subpeona to a person in a small, rural community one afternoon. The officer was given the person's office and home addresses, but no directions. Once he was in the small town where the person lived, he found there were no street signs. He came to a crossroad--should he turn right, left or go straight? Intuitively, he turned right, made a couple of more turns and found himself on the correct street.

On his way back, he thought about how he found the correct address. He realized that he remembered seeing the courthouse and found himself proceeding in that direction. He sensed that the house he was looking for was in an older part of town. It makes sense to turn towards the courthouse; the old courthouse wouldn't be in the new part of town. But he wasn't thinking about that at the time he was looking for the address. He followed his hunches.

DEFINITION:

Intuitive thinking is the use of one's "gut level" feelings or hunches as an additional source of input or data.

RATIONALE:

There are times when a decision needs to be made quickly, often with a shortage of pertinent facts, previous decisions or when time simply does not allow the decision maker to spend a considerable amount of time analyzing the situation. In such times, it is not uncommon to use one's gut feelings or hunches to find a solution or make a decision. Intuition can be a legitimate and valuable tool in problem solving and decision making. The technician needs to be more aware of their personal feelings and more willing acts on their hunches.

INTENDED LEARNER OUTCOMES:

A learner who has mastered this competency will be able to:

1. Describe how intuition can be combined with objective data.

2. Argue the benefits of combining intuitive data with objective data to produce a richer basis for decision and action.

3. Trust the validity of thinking intuitively and acting on one's hunches.

4. Given several hypothetical situations, intuitively select a solution.

RESOURCES/REFERENCES (listed in order from best to least best for instructional purposes):

Goldgerg, Philip. (1985). Understanding and Developing Intuition. Bethesda: World Future Society.

Pryor, Fred. (1987, July). Intuition: Making the Most of Your Hunches. The Pryor Report, p. 3.

Guillen, Michael. (1984, August). The Intuitive Edge. Psychology Today, pp. 68-69.

Agor, Weston. (1986). The Logic of Intuitive Decision Making. Westport: Greenwood Press.

Staff. (1986, October). Intuition: Management Skill for the '90s? Training, pp. 12-13.

Staff. (1986, March). I Can Just Feel It! The Pryor Report, p. 10.

"The Intuitive Manager", film, MTI Film & Video, 108 Wilmot Road, Deerfield, IL 60015, (800) 621-2131, $59.95.

Gittelson, Bernard and the Institute for Advanced Psychology. "Perceptron-Develop Your Intuitive Powers." Teaching unit with comprehensive booklet, instruction booklet and warranty Organization Design and Development; 101 Bryn Mawr Ave.; Bryn Mawr, PA 19010; (215) 525-9505.

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*1986. For more information contact Dr. Richard K. Hofstrand,Ph.D. Eastern Ill. University, Charleston, IL 61920; 217-581-3912.

GENTEC/intuitiv

GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Technical Communication - Verbal and Non-Verbal

EXAMPLE:

"This is Cessna 26 Romeo Echo Bravo calling Springfield Tower."

"Cessna 26REB. This is Springfield Tower."

"Entering airspace. Need Squak code."

"Cessna 26REB, your Squak code is three six zero niner. Repeat 3609."

Technical verbal communications between pilot and tower is critical. The safety of life and equipment are in danger. Technical communication must be accurate and brief. Specialized codes and words are used to communicate effectively and efficiently. Each must know what the other is saying. And brevity is of the essence so as to not fill the airwaves with non-vital transmissions.

DEFINITION:

Technical verbal and non-verbal communications is the efficient and effective exchange of information between technicians using nomenclature, terms, acronyms and jargon.

Non-spoken communication are those messages relayed to the receiver by the sender's movements, expressions and gestures.

RATIONALE:

Often, a message a speaker sends non-verbally contradicts what the speaker is actually saying. The results can shift the meaning of a conversation entirely, resulting in misinterpretations. Once identified, destructive non-verbal messages and signals can be eliminated. The elimination of destructive non-verbal communication will help to increase the speaker's influence skills.

Technical verbal and non-verbal communication is important in all occupational areas. Technical communication between dentist and dental assistant, between physician and nurse, between chef and pastry cook, between diesel engine mechanic and parts supplier: all require precise verbal and non-verbal, written and oral communications.

INTENDED LEARNER OUTCOMES:

A learner who has mastered this competency will be able to:

1. Describe the importance of accuracy in technical verbal and non-verbal communications.

2. Interpret non-verbal communications from clients or customers.

3. Defend the need for brevity in technical communications.

4. Describe, in writing, a technical procedure so that another technician might replicate it. Brevity is crucial.

RESOURCES/REFERENCES (listed in order from best to least best for instructional purposes):

Staff. (1986, August). Putting Your Theories in Practice. Pryor Report, p. 6.

"The 10 Commandments of Rewarding," film/video, Roundtable, 113 North San Vicente Boulevard, Beverly Hills, CA 90211-2387 (800) 332-4444.

"Communications," cassettes and manual, Training Resource Corporation, Five South Miller Road, Harrisburg, PA 17109-9990, (800) 222-9909.

"The Smith-Elliott Listening Test," cassettes and manual, Learning Dynamics Incorporated, P.O. Box 323, Needham, MA 02192, (617) 332-7070.

"Who's On 1ST," film/video, Salenger Films, 1635 Twelfth Street, Santa Monica, CA 90404, (213) 450-1300.

"Negative Feedback/Postive Results," overhead transparencies, reproducible handout masters, Training Resource Corporation, Five South Miller Road, Harrisburg, PA 17109, (800) 222-9909.

"Listening & Communicating Skills," cassettes, facilitator's guide, University Associates, Inc., 8517 Production Avenue, San Diego, CA 92121, (619) 578-5900.

"I-SPEAK Your Language," video and related materials, Drack Beam Morin, Inc., 100 Park Avenue, New York, NY 10017, (212) 692-7709.

"Listen!" video, United Training Media, 6633 W. Howard Street, Niles, IL 60648, (312) 647-0600.

"The Supervisory Training Circles Modules," Module 4, video, Learning Dynamics, Inc., P.O. Box 323, Needham, MA 02192, (800) 225-1558.

"You're Not Listening," video, Barr Films, 3490 E. Foothill Blvd., P.O. Box 5667, Pasadena, CA 91107, (213) 681-2165.

"You're Not Communicating," video, Barr Films, 3490 E. Foothill Blvd., P.O. Box 5667, Pasadena, CA 91107, (213) 681-2165.

"Communication Effectiveness Scale (CES), survey, test, questionnaire, Management Research Systems Publications, 2320 S. Third St., Ste. #7 Jacksonville Beach, FL 32250.

"Learn to Put Your Ideas Across Effectively in any Business Situation," video and sample package, Drake Beam Morin, Inc., 100 Park Avenue, New York, NY 10017.

"Communicating Clearly," workshop, Learning Dynamics, Inc., P.O. Box 323, Needham, MA 02192.

"Listening and Communicating Skills," tape, University Associates, Inc., 8517 Production Ave. San Diego, CA 92121, (619) 578-5900.

"Communication: The Basic Job Skill," filmstrip and cassettes, Sunburst Communications, Room M838, 39 Washington Avenue, Pleasantville, NY 10570-9971, (800) 431-1934.

"Communication Skill Training," (transparencies, workbook, trainer manual, brochures), Interpersonal Communication Programs, Inc., 7201 South Broadway, Littleton, CO 80122, (303) 794-1764.

"Basic Steps for Better Business Writing," videocassettes, Britannica Training and Development, 780 South Lapeer Road, Lake Orion, MI 48035, (800) 554-6970.

"How to Improve Your People Skills," videotapes, study guide, books, Dynamics of Human Behavior, 880 Lincoln Center Dr., Foster City, CA 94404, (800) 443-0100, ext. 278.

"Effective Presentation Skills," course, Educational Marketing Services, Inc., 5151 Monroe St., P.O. Box 23038, Toledo, OH 43623, (419) 885-4675.

"Selling Your Ideas," Mohr Development Co., 30 Oak St., Stamford, CT 06905, (203) 357-1357.

"The Skills to Build Winning Teams," Learning Dynamics Inc., P.O. Box 323, Needham, MA 02192, (800) 225-1558.

"Are You Really Listening?," video, Britannica Training & Development, 1488 South Lapeer Road, Lake Orion, MI 48035.

"Communications That Work," video w/leader's guide, 5 participant manuals, American Management Association, Customer Service Center, Nine Galen Street, Watertown, MA 02172, (800) 225-3215.

"How to Speak Persuasively," audio-cassette/workbook, American Management Association Extension Institute, P.O. Box 1026, Saranac Lake, NY 12983-9986, (518) 891-5510.

"Executive Writing, Speaking, and Listening Skills," cassettes w/workbook, American Management Association Extension Institute, P.O. Box 1026, Saranac Lake, NY 12983-9986, (518) 891-5510.

"Direct Communication: How To Communicate With More Power and Influence," cassettes w/application guide, The Atlanta Consulting Group, 2028 Powers Ferry Road, Suite 190, Atlanta, GA 30339, (404) 952-8000, $22.95.

"Person to Person Communication #401," video w/guide, Roundtable Film & Video, 113 North San Vicente Boulevard, Beverly Hills, California 90211-9965, (800) 332-4444, $99.

"Effective Presentations," video, Van Dyck Communications, 832 Folsom Street, San Francisco, CA 94107, (415) 546-1700.

"Corporate Grammar," audiocassette w/guide, Learn, Inc., Dept. O. J., 113 Gaither Drive, Mt. Laurel, NJ 08054-9987, (609) 234-6100, ext. 123.

"Speech Power," 12 audiocassettes w/workbook, Learn, Inc., Dept. O. J., 113 Gaither Drive, Mt. Laurel, NJ 08054-9987, (609) 234-6100, ext. 123.

"Listen Your Way To Success," 3 audiocassettes w/guide, Learn, Inc., Dept. O. J., 113 Gaither Drive, Mt. Laurel, NJ 08054-9987, (609) 234-6100, ext. 123.

"Power English and Word Command," 4 audiocassettes w/3 workbooks, Learn, Inc., Dept. O. J., 113 Gaither Drive, Mt. Laurel, NJ 08054-9987, (609) 234-6100, ext. 123.

"Vocabulary," 5 audiocassettes w/48 page study guide, Learn, Inc., Dept. O. J., 113 Gaither Drive, Mt. Laurel, NJ 08054-9987, (609) 234-6100, ext. 123.

"Power Writing," 4 audiocassettes, 4 workbooks, 3-book writer's reference library, Learn, Inc., Dept. O. J., 113 Gaither Drive, Mt. Laurel, NJ 08054-9987, (609) 234-6100, ext. 123.

"Non-Verbal Communication," video, Britannica, Training and Development, 1488 South Lapeer Road, Lake Orion, MI 48035, (800) 554-6970.

"The Jones-Mohr Listening Test," album, audiocassette, guide, & test forms, Order Department, University Associates, Inc., 8517 Production Avenue, San Diego, CA 92121, (619) 578-5900.

"Communication Skills: Verbal and Written," video, East-West Technological Center, Attention: Marketing Services, 1751 West Diehl Road, Naperville, IL 60540-9075, (312) 369-3000.

"Listening to Others", video VHS/Beta, 14 minutes, color; FILMS FOR THE HUMANITIES, PO Box 2053, Princeton, NJ 08543; (800) 257-5126.

"Expressing Yourself", video VHS/Beta, 20 minutes, color; FILMS FOR THE HUMANITIES, PO Box 2053, Princeton, NJ 08543; (800) 257-5126.

"Listen and Be Listened To", Audio-Cassette Workbook Program; six cassettes and comprehensive workbook; American Management Assoc. Extension Institute, P.O. Box 1026, Saranac Lake, NY 12983-9986.

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*1986. For more information contact Dr. Richard K. Hofstrand, Ph.D. Eastern Ill. University, Charleston, IL 61920; 217-581-3912.

DEVELOPMENTAL DRAFT
For discussion purposes only

GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Technical Concentration

EXAMPLE:

At a CHAMPION Spark Plug production plant in eastern Ohio, most employees earn minimum wage. But one group of employees earns four times minimum wage. Those are those few employees who inspect each and every spark plug produced to make sure it meets all standards. Hour after hour, day in and day out, these employees watch a computer screen that provides an electronic view of each spark plug coming off the assembly line. The work is not physically difficult. Nor is it highly technical. It is, however, mentally and emotionally demanding because the worker must concentrate solely on each spark plug. Few people want to do it. You must think only about spark plugs. There is no time for "schmoozing," social interaction with fellow workers. The worker is isolated to help them concentrate.

DEFINITION:

Technical concentration is the competency to continually focus one's attention on immediate tasks; to screen out distractions.

RATIONALE:

Technical occupational tasks are "mindful", not "mindless" tasks. The technician must actively think about what they are doing. Distractions must be screened out. Regardless of what's going on in the cockpit, the pilot must still fly the plane. There is little time for merely "doing the job."

Technicians must understand the importance of occupational concentration, be able to control their work environment to foster concentration, and be able to perform those techniques which aid in concentration.

INTENDED LEARNER OUTCOMES:

A learner who has mastered this competency will be able to:

1. Defend the need for technical concentration in their particular technical field.

2. Given three technical work settings, design and defend an improved work arrangement which would foster concentration.

3. List and enact those personal techniques which foster technical concentration.

RESOURCES/REFERENCES (Listed in order from best to least best for instructional purposes):

"Concentration," audiotape cassette, Western Office, Box 875, Zephyr Cove, NY 89448.

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*1987. For more information contact Richard K. Hofstrand, Ph.D. Eastern Ill. University, Charleston, IL 61920; 217-581-3912.

GENTEC/concentrate

DEVELOPMENTAL DRAFT
For discussion purposes only

GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Resolving Conflict

EXAMPLE:

A veterinarian hired an assistant to care for the dogs and cats in the boarding kennel that she operated as a service to her practice. The vet explained to the assistant that his responsibility was to care for the animals which included feeding, grooming and cleaning the cages twice daily. The assistant felt confident in carrying out his duties.

The assistant had been working at the kennel for about a week and noticed that for the previous three days most of the animals were not hungry at their feeding time as they usually were. The assistant approached the vet and told her of his concerns. The vet promptly answered with the fact that she had also been feeding the animals, but at different times than the assistant.

The assistant was confused and felt that he was being mistrusted and second-guessed. He was performing the responsibilities delegated to him by the vet but was not being trusted.

DEFINITION:

The use of effective strategies of settling situations when self interests clash.

RATIONALE:

Role confusion, as in the previous example, can be a major cause of conflict between technicians. However, conflict can stem from many other causes, too. They include: false assumptions, unreasonable expectations, conflicting personal values, needs and/or wants, cultural differences, age and gender differences and knowledge. It is important for technicians to understand the underlying causes of conflict in order to most effectively deal with others.

The solution to resolving conflict is not easy and not necessarily the same for every situation. For those involved in a situation of conflict, various methods can be applied. After learning and experiencing various conflict resolution methods, one can begin to concentrate on learning to prevent conflict before the situation has ballooned out of control.

Technicians should also understand that conflict can be constructive if dealt with in the correct manner. Constructive conflict can facilitate creativity for solutions to the problem which is causing the conflict.

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*1986. For more information contact Dr. Richard K. Hofstrand, PhD. Eastern Ill. University, Charleston, IL 61920; 217-581-3912.

INTENDED LEARNER OUTCOME:

A learner who has mastered this competency will be able to:

1. Describe how conflict can be destructive.

2. Explain how to prevent conflicts before they start.

3. Determine the true causes of conflict in a simulated situation.

4. Enact various methods of conflict resolution.

INSTRUCTIONAL RESOURCES/REFERENCES (Listed in order from best to least best):

Brenner, Charles. (1982). The Mind in Conflict. New York: International University Press.

Nye, Robert D. (1973). Conflict Among Humans: Some Basic Psychological and Social Psychological Considerations. New York: Springer Publishing Company.

Staff. (1986, October). Setting Clear and Challenging Goals, The Pryor Report, p. 7.

Staff. (1986, August). The Unpopular Staff Member, The Pryor Report, p. 2.

Chasnoff, Robert and Muniz, Peter, (1985, January). "Training to Manage Conflict," Training and Development Journal, pp. 49-53.

Karp, H.B. (1984, March). "Working With Resistance," Training and Development Journal, pp. 69-73.

Caffarella, Rosemary, (1984, February). "Managing Conflict: An Analytical Tool," Training and Development Journal, pp. 34-38.

"Handling Conflict," workshop, Learning Dynamics, Inc., P.O. Box 323, Needham, MA 02192.

"Conflict Management," Role play/simulation game, Management Research Systems Publications, 2320 S. Third St., Suite #7, Jacksonville Beach, FL 32250.

"The Thomas-Kilmann Conflict Mode Instrument," booklet, XICOM, Sterling Forest, Tuxedo, New York 10987, (800) 431-2395.

"Managing Conflict," video w/workbook, American Management Association Extension Institute, P.O. Box 1026, Saranac Lake, NY 12983-9986, (518) 891-5510.

"Conflict: Managing Under Pressure," video w/guide, American Management Association, Customer Service Center, Nine Galen Street, Watertown, MA 02172, (800) 225-3215.

GENTEC/conflict

DEVELOPMENTAL DRAFT
For discussion purposes only

GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Occupational Creativity/Innovation

EXAMPLE:

A contractor was building a house according to the owner's specifications. The owners had requested that several of the doorway openings be arched instead of squared. The problem was that the contractor had never constructed an arched doorway before. He did not know how to arch the opening but knew that to maximize his profits, he had to do the job himself. After carefully analyzing the request, he relied on what he already knew about the construction of squared doorways and basic construction rules, and created the arch opening according to the owner's specifications.

DEFINITION:

Occupational creativity/innovation is the envisioning of alternate occupational processes and/or products which are more efficient and/or effective.

RATIONALE:

Innovative thinking is becoming an increasingly necessary survival skill in today's changing technology. Given a problem, technicians can challenge their imagination with creative thinking. Those who generate ideas and implement them experience a sense of accomplishment and increased self-confidence. As the construction worker learned by using his creativity he maximized his profits, other technicians in other occupations can also experience the benefits of creativity.

INTENDED LEARNER OUTCOME:

A learner who has mastered this competency will be able to:

1. Be more tolerant of risk.

2. Defend the need for creativity in a work setting.

3. Implement creative thinking in a work setting.

RESOURCES/REFERENCES (listed in order from best to least best for instructional purposes).

Willis, Harman and Rheingold, Howard. (1985). Higher Creativity: Liberating the Unconscious for Breakthrough Insights. Bethesda: World Future Society.

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*1986. For more information contact Dr. Richard K. Hofstrand,Ph.D. Eastern Ill. University, Charleston, IL 61920; 217-581-3912.

VanGundy, Arthur B. (1982). Training Your Creative Mind. Englewood Cliffs: Prentice-Hall.

Staff. (1986, October). Spurs to Thinking, Pryor Report, p. 3.

Staff. (1986, October). New Uses for Familiar Things, Pryor Report, p. 5.

Staff. (1986, August). Unexpected Surprises, Pryor Report, p. 6.

Gordon, Jack & Zemke, Ron. (1986, May). Making Them More Creative. Training, pp. 30-45.

Rehder, Robert, (1985, July). "Stifling Innovation and Change," Training and Development Journal, pp. 60-64.

Suzawa, Soichi, (1985, May). "How the Japanese Achieve Excellence," Training and Development Journal, pp. 110-117.

Ray, Darrel W. & Wiley, Barbara L. (1985, January). How to Be an Idea Generator. Training and Development Journal, pp. 44-47.

Gryskiewicz, Stanley S., & Burnside, Robert M. (Eds.). (1985). Creativity Week VIII, Greensboro: Center for Creative Leadership.

"Mental Blocks," game, Training House, Inc., P.O. Box 3090 Princeton, NJ 08543-3090, (609) 452-1505.

"A Whack, A Kick, and A Poke: How to Be More Creative," and "Creative Thinking", cassettes, Nightingale-Conant Corporation, 7300 North Lehigh Avenue, Chicago, IL 60648-9951, (800) 323-5552.

"Innovation," video, American Management Association, 85 Main St., Watertown, MA 02172, (800) 225-3215.

"Stein on Creativity," a videotape featuring Morris I. Stein, Ph.D. from Center for Creative Leadership, P.O. Box P-1, Greensboro, NC 27402-1660, (919) 288-7210, ext. 354.

"Uncover Your Creativity," film, Salenger Films/Videos, 1635 Twelfth Street, Santa Monica, CA 90404, (213) 450-1300.

"Creative Thinking," manual, Possibilities, Inc., 88 S. Finley Ave., P.O. Box 433, Basking Ridge, NJ 07020.

GENTEC/creative

DEVELOPMENTAL DRAFT
For discussion purposes only

GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Technical Diagnostics

EXAMPLE:

As you drive down the street, your car's engine dies. You roll to a stop at the edge of the highway. Fortunately, a gas station with a mechanic on duty is located directly across the street. The auto mechanic follows you toward your car to help with your dilemma. As she opens the hood, you have visions of gnarled metal parts, time consuming delays and an expensive bill. Within a few moments, the mechanic has diagnosed your problem; you have run out of gas. But she also alerts you that your air filter is dirty and that the ventura of your carburetor indicates signs of a rich fuel-air mixture signalling a need for carburetor adjustment.

DEFINITION:

Technical diagnostics is the analysis of relevant data and prescription of remedial action to correct system malfunctions.

Technical Diagnostics differs from traditional problem solving in that with problem solving, a variety of plausible solutions exist, some being better than others, but that a variety of solutions would solve the problem. In Technical Diagnostics, however, the problem lies within a technical function (electrical, mechanical, biological, and/or human system) in which only one precise solution can remedy the problem.

RATIONALE:

The ability to diagnose medical problems is a key competence of the medical profession. Physicians spend considerable time in their professional training analyzing the cause-effect relationships of non-healthy situations. So also, it is increasingly imperative that technicians in all occupational areas understand the concept and be able to perform the steps in performing technical diagnostics. Competence in technical diagnostics prepares workers who understand the sequential steps of diagnostics and are able to improve the speed and precision of technical diagnosis.

INTENDED LEARNER OUTCOME:

A learner who has mastered this competency will be able to:

1. Describe the concept of technical diagnostics.

2. Recite the steps in performing a technical diagnosis.

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*1986. For more information contact Dr. Richard K. Hofstrand,Ph.D. Eastern Ill. University, Charleston, IL 61920; 217-581-3912.

3. Define the contectual information/data important to a particular diagnosis.

4. Generate three or more plausable causes of a technical problem.

5. Arrange those causes in descending order form most probable to least probable and prescribe and/or perform remedial action.

RESOURCES/REFERENCES (listed in order from best to least-best for instructional purposes):

Meyers, Chet. (1985). Teaching Students to Think Critically, A Guide for Faculty in All Disciplines. San Francisco: Jossey-Bass Inc.

Sternberg, Robert J. (1985, November). Teaching Critical Thinking, Part 1: Are We Making Critical Mistakes? Phi Delta Kappan, pp. 194-198.

Condon, Mary. (1985, March). How Do You Teach Managers to Think? Training and Development Journal, pp. 16-22.

Settle, Mary. (1985, March). Diagnostics First. Training and Development Journal, pp. 8-10.

"Brain Building: Easy Games to Develop Your Skills", Shamrock Press, Div. of Karl Albrecht & Assoc., 1277 Garnet Avenue, San Diego, CA 92109, (619) 272-3880.

DEVELOPMENTAL DRAFT
For discussion purposes only

GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Intrapreneurship

EXAMPLE:

Arthur Fry, a 3M chemical engineer, got annoyed at how many pieces of paper that marked his church hymnal always fell out when he stood up to sing. He knew that Spencer Silver, a scientist at 3M, had accidentally discovered an adhesive that had very low sticking power. In some instances this would be bad, but for Fry it was good. He began working on this idea on company time, since 3M allows employees to spend 15% of their office time on independent projects. He made samples and distributed the small yellow pads to company secretaries. They were delighted with the new product, which 3M eventually began selling it under the name Post-it. Sales last year for 3M's ost-it amounted to more than $100 million. (Time, Feb. 1985)

DEFINITION:

Intrapreneurship is the use of entrepreneurial talent inside organizations to develop new products or services.

RATIONALE:

Intrapreneurship allows a technician to learn to use entrepreneurial talent more rapidly. Creating within an organization becomes a learning experience for the technician. Many idea generators feel a deep sense of failure when an idea does not work out as expected. Intrapreneurs do not feel this failure when they fail. They are encouraged to simply try it again.

INTENDED LEARNER OUTCOME:

A learner who has mastered this competency will be able to:

1. Define the concept of intrapreneurship.

2. Describe the difference between intrapreneurship and entrepreneurship.

3. Apply the concept of intrapreneurship to an occupational setting.

INSTRUCTIONAL RESOURCES/REFERENCES (Listed in order from best to least best):

Staff. (1985, February). Here Come the Intrapreneurs, Time, pp. 36-37.

Pinchott, Gifford III. ( ). Intrapreneuring, or Why You Don't Have to Leave the Corporation to Become an Entrepreneur. Harper & Row.

"Intrapreneurs," film, McGraw-Hill Training Systems, P.O. Box 641, Del Mar, CA 92014-9988, $695.00.

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GENTEC/intrapre

DEVELOPMENTAL DRAFT
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GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Technical Influencing

EXAMPLE:

It has been reported that the space shuttle tragedy might have been avoided if the people in control had better influencing skills. It seems that the officials that felt the shuttle should not be launched were not able to convince others of their concerns. (Pryor Report, 1986)

DEFINITION:

Technical influencing is the enhancing of one's status to affect policy, procedure or product decisions.

RATIONALE:

Being able to convince others of proposals or suggestions largely depends on one's influencing skills. Improving these skills will help increase a technician's status within their occupational setting.

INTENDED LEARNER OUTCOME:

Learners who have mastered this competency will be able to:

1. Voice their concerns frankly and openly.

2. Increase their chances of successfully introducing proposals and/or ideas.

RESOURCES/REFERENCES (listed in order from best to least best for instructional purposes):

Smith, Mary John. (1982). Persuasion and Human Action: A Review and Critique of Social Influence Theories. Belmont: Wadsworth Publishing Company.

Hollander, Edwin Paul. (1978). Leadership Dynamics: A Practical Guide to Effective Relationships. New York: Free Press.

Cox, Robert W. & Jacobson, Harold K. (1973). The Anatomy of Influence: Decision Making in International Organizations. New Haven: Yale University Press.

Wheeler, Ladd. (1970). Interpersonal Influence. Boston: Allyn and Bacon.

Gamson, William A. (1968). Power and Discontent. Homewood: Dorsey Press.

Staff (1986, August). How to Increase Your Power. Pryor Report, p. 11.

"Getting the Job Done: Through Influence," video w/leader's guide, American Management Association, Customer Service Center, Nine Galen Street, Watertown, MA 02172, (800) 225-3215.

Berlew, David E. (1985, September). How To Increase Your Influence. Training and Development Journal, pp. 60-63.

"Selling Your Ideas," Mohr Development Co, 30 Oak St., Stamford, CT 06905, (203) 357-1357.

Executive Communications, periodical, Magna Publications, Inc., Customer Service Department, 2718 Dryden Drive, Madison, WI 53704.

"Influencing: Marketing the Ideas That Matter," hardbound, Order Department, University Associates, Inc., 8517 Production Avenue, San Diego, CA 92121, (619) 578-5900, $19.95.

"Influence and Empowerment--Techniques to be More Effective in Your Job," workshop by The Leadership Development Center, 4541 North Prospect Road, Suite One, Peoria, IL 61614, (309) 685-1900.

"Listen and Be Listened To", Audio-Cassette/Workbook Program; six information-packed cassettes and comprehensive workbook; American Management Assoc. Extension Institute; P.O. Box 1026; Saranac Lake, NY 12983-9986; (518) 891-5510.

"How to Negotiate", Audio-Cassette/Workbook Program; six information-packed cassettes amd comprehensive workbook; American Management Assoc. Extension Institute; P.O. Box 1026; Saranac Lake, NY 12983-9986. (518) 891-5501.

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DEVELOPMENTAL DRAFT
For discussion purposes only

GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Technical Judgment

EXAMPLE:

"My job is to train health care workers. This includes health care technicians as well as nurses aides. The students who have finished my program usually go to work in entry level technical jobs in hospitals and nursing homes. I tell them that they are the `eyes and ears' of the patient. They get to know each patient well; their pains, their families, their worries and problems. They work with the patient through the ups and downs.

My toughest training task is to train my students when to alert a higher level for medical help. Because my students get to know the patients so well, they often see medical signs even before the patient realizes them; change in skin color, change in eye clarity, a new pain in a critical area. The nursing professionals do not want to be called for every minor development. The medical technician, therefore, must learn to decide when to alert others. That is, they must make a decision as to whether to report these new medical observations. My toughest task is to train them on how to make those occupational descisions, those `judgment calls' if you please." (White, 1986)

DEFINITION:

Technical judgment is the selection of a best alternative from a variety of courses of action to reach desired objective(s).

RATIONALE:

Learning to choose between two or more possibilities often presents a problem for some people. Technical judgment involves personal thought, obtaining and evaluating input from other sources and progressing through a series of sequential steps to reach a sound judgment.

INTENDED LEARNER OUTCOME:

A learner who has mastered this competency will be able to:

1. Describe the concept of and appreciate the need for technical judgment.

2. Identify the different styles of making judgments.

3. Recognize the different types of judgments that an employed person may face in an occupational setting.

4. Value the importance of structured thought in reaching wise judgments on the job.

5. Recite the sequential steps in making a technical judgment.

6. List three or more alternatives to a given situation which requires a judgment.

7. Rank order choices from "best" to "worst" and justify your choices.

8. Approach a situation which requires a technical judgment objectively and apply the concepts of technical judgment.

9. Define at least 80% of the terms commonly used when discussing the concept of Technical Judgment.

RESOURCES/REFERENCES (listed in order from best to least best for instructional purposes):

Burton, Leon H. & Woltag, Susan N. (1986). Pathways: Guidance Activities for Young Children. Menlo Park: Addison-Wesley.

Brim, Orville Gilbert. (1984). Personality and Decision Processes; Studies in the Social Psychology of Thinking. Stanford: Stanford University Press

Pfeiffer, J. William and Goodstein, Leonard D., Editors. (1983). The Annual for Facilitators, Trainers and Consultants. San Diego: University Associates, Inc.

Bonini, Charles P. (1983). Simulation of Information and Decision Systems in the Firm. Englewood Cliffs: Prentice Hall.

Arnold, John D. (1978). Make Up Your Mind: The Seven Building Blocks to Better Decisions. New York: AMACOM.

Fisher, Aubrey B. (1974). Small Group Decision Making: Communication and the Group Process. New York: McGraw Hill.

Cassel, Russell Napolean. (1973). The Psychology of Decision Making. North Quincy: Christopher Publishing House.

Collins, Barry E. & Guetzkow, Howard. (1964). A Social Psychology of Group Processes for Decision Making. New York: Wiley.

Staff. (1986, October). Part and Whole, Pryor Report, p. 12.

White, M. Interviewed by R. K. Hofstrand at Sarah Bush Lincoln Medical Center in Mattoon, Illinois in September, 1986.

"Decision Making: Alternatives and Information," video, Barr Films, Box 5667, 3490 E. Foothill Boulevard, Pasadena, CA 91107.

"Decision Making: Outcomes and Action," video, Barr Films, Box 5667, 3490 E. Foothill Boulevard, Pasadena, CA 91107.

"Group Decision Making," Role Play/Simulations game, Management Research Systems Publications, 2320 S. Third St. Ste. #7, Jacksonville Beach, FL 32250.

"Effective Supervisory Leadership II (ESL)," Management Research Systems Publications, 2320 S. Third St., Ste. #7, Jacksonville Beach, FL 32250, (904) 241-1721/241-1722.

"A Time To Decide, The Ethics of Life/Death Decision Making," video, United Training Media, P.O. Box 718, 6633 West Howard Street, Niles, IL 60648-9990, (800) 558-9015 in IL (312) 647-0600.

Making Decisions: You Can Learn How," filmstrip and cassettes, Sunburst Communications Room M838, 39 Washington Avenue, Pleasantville, NY 10570-9971, (800) 431-1934, from New York (800) 221-5912.

How To Make Good Decisions, Part III--Group Decision-Making," filmstrips and cassettes, Sunburst Communications Room M838, 39 Washington Avenue, Pleasantville, NY 10570-9971, (800) 431-1934 from New York (800) 221-5912.

"Decision Making," a two-day skill development module, Development Dimensions International, Development Dimensions Plaza, 1225 Washington Pike, Box 13379, Pittsburgh, PA 15243-0379, (412) 257-0600.

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DEVELOPMENTAL DRAFT
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GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Technical Networking

EXAMPLE:

Interviewer: "You say that you're doing word processing on a microcomputer but that you've never been formally trained on how to do that. How did you learn to do word processing?"

Interviewee: "Well, I knew that if I could learn word processing, they would move me up to a higher secretarial position that would pay more money. So I found a couple of people here in the building that already knew the word processing software. I talked to them, got the software documentation and started trying to do it on my own. I knew that if I ever got into trouble and needed help, I could call one of them. Since that time, I've also learned some spread sheet software. I learned that on my own, too, with some help from different people in the building who I have happened on by chance." (Millburg, 1986).

DEFINITION:

Technical networking is forming and using relationships to facilitate technical competence and proficiency.

RATIONALE:

Technical networking encourages technicians to locate and utilize personal contacts who have similiar experience to help solve problems. The secretary who knew she would advance if she learned word processing made her own network of co-workers who have word processing experience. She uses these contacts as sources of reference to assist her in learning word processing.

Support groups may be formed as a result of technical networking which allow workers to focus on shared problems and frustrations and work toward their common goal. Technicians learn that others may be experiencing similiar situations. Together they may pool their resources to overcome the problem. Also, groups with a common interest may form to help share the cost of available resources such as workshops and conferences.

INTENDED LEARNER OUTCOME:

A learner who has mastered this competency will be able to:

1. Describe the benefits of technical networking.

2. Define his/her existing network.

3. Expand that network by at least 10% each year.

RESOURCES/REFERENCES: (listed in order from best to least best for instructional purposes:)

Lipnack, Jessica & Stamp, Jeffrey. (1986). The Networking Book: People Connecting with People. New York: Routledge & Kegan Paul.

Naisbitt, J. & Aburdene, P. (1985). Re-Inventing the Corporation. New York: Warner Books.

Ollson, M. & Lippitt, Ronald. (1985, February). Networking for Support, Growth and Gain. Training. pp. 65-67.

McInnis, Noel. (1984, June). Networking. A way to manage our changing world? The Futurist. pp. 9-10.

Quick, S., Flashman, R., & Gibeau, Arlene. (1984, June). Sharing our selves. A basis for lifelong learning. The Futurist. pp. 20-23.

Millburg, C. Interviewed by R. K. Hofstrand in the Illinois Department of Transportation in Springfield, Illinois on 15 October 1986.

"Networking: A Compendium of Ideas," Carole Spencer, Editor. Order Code: SPNC, Published by ASTD, 1987. $8/ASTD National Members. Order from: ASTD Publishing Service, P.O. Box 4856, Hampden Station, Baltimore, MD 21211.

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GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Preventive Maintenance

EXAMPLE:

A data entry operator in an oil drilling company was facing a dilemma. She had had to call the repair person three times in six months to repair various keys on the keyboard which, for some reason, kept sticking. One day when the service person was fixing the machine, she expressed her dismay to him and was surprised to learn that this malfunction could have been avoided had she learned a few simple procedures. The operator learned that by using a special brush, she could keep her keyboard cleaned out which would in turn, help the machine to continue to operate efficiently.

This was good news to not only the data entry operator but also the owner of the business. It meant more uptime for the operator to be productive, which means more output for the owner.

DEFINITION:

Preventive maintenance is the identification and performance of routine precautions to keep occupational facilities and equipment operating at maximum performance.

RATIONALE:

An effective program of preventive maintenance for an organization means less downtime as well as lowered maintenance costs. Trained technicians can learn to perform routine tasks which contribute to the efficiency of operation of the equipment.

INTENDED LEARNER OUTCOMES:

A learner who has mastered this competency will be able to:

1. Describe the nature of preventive maintenance.

2. Defend the importance of preventive maintenance.

3. List the sequential steps of preventive maintenance for a particular piece of equipment or facility.

RESOURCES/REFERENCES (listed in order from best to least best for instructional purposes):

"Implementing a Preventive Maintenance Program," TPC Training Systems, 1301 S. Grove Avenue, Box 1030, Barrington, IL 60010, (312) 381-7015.

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DEVELOPMENTAL DRAFT
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GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Priority Setting

EXAMPLE:

The professional secretary leaves the boss's office with arms filled with files to be processed and then refiled, dictation to be transcribed, notes on travel reservations to be made, sketches of new projects to be initiated, ideas as to what can be delegated to whom and concerns as to how to accomplish all by 5 o'clock. The scenerio is common for professional secretaries, administrative assisstants, or any other technical occupations: Numerous occupational tasks to be accomplished in a sometimes seemingly impossible time frame.

DEFINITION:

Priority setting is the sequencing of occupational obligations/assignments to maximize the use of available time and energy.

RATIONALE:

A recent survey of American workers revealed that a majority of those workers felt they had discretion in which work tasks they addressed and when. In other words, a sizeable faction of the American workforce has control over what is done and when. The question is: Are the most important things being accomplished first and best? How does a technician select the "most important tasks" from "lesser important tasks?" How should occupational duties be sequenced during a work shift so that the "must-get-done" tasks get done?

INTENDED LEARNER OUTCOMES:

A learner who has mastered this concept will be able to:

1. Appreciate the need for skill in sequencing priority occupational tasks.

2. Set job priorities within a given time frame.

3. Effectively sequence job dutes and tasks.

4. Allocate personal time wisely in order to make the best use of available time and resources.

RESOURCES/REFERENCES (listed in order from best to least best for instructional purposes):

Douglas, Merrill E. & Douglass, Donna N. (1980). Manage Your Time, Manage Your Work, Manage Yourself. New York: AMACOM.

Winston, Stephanie. (1978). Getting Organized: The Easy Way to Put Your Life in Order. New York: Norton.

Bliss, Edwin C. (1976). Getting Things Done: The ABC's of Time Management. New York: Scribner.

Staff. (1986, October). The Talk-to File. Pryor Report, p. 6.

Staff. (1986, October). Improving Your Time Management. Pryor Report, p. 8.

Staff. (1986, October). Chaos Will Stop at 3 O'Clock. Pryor Report, p. 11.

Staff. (1986, August). The Strategic Reserve. Pryor Report, p. 10.

Flowers, Jacquelyn, (1985, February). More on Time. Training and Development Journal, p. 13.

"How to Get Control of Your Time and Your Job", video, Cally Curtis Co., 1111 N. Las Palmas Avenue, Hollywood, CA 90038-9981, (213) 467-1101.

"Beyond Time Management Organizing the Organization", Allen Jane, Addison-Wesley Training Systems, Reading, MA 01867, (617) 944-3700, ext. 271.

"The Time of Your Life", video, Cally Curtis Co., 1111 N. Las Palmas Avenue, Hollywood, CA 90038-9981, (213) 467-1101.

"Time Management and Delegation," workshop, Learning Dynamics P.O. Box 323, Needham, MA 02192.

"The Game of Time Management, Training House, Inc. P.O. Box 3090, Princeton, NJ 08543-3090, (609) 452-1505.

"Time Management," Role play/simulations game, Management Research Systems Publications, 2320 S. Third St., Ste. #7, Jacksonville Beach, FL 32250.

Reproducible Supervisory Tests Trainer's Kit: Time Management, test, Management Research Systems Publications, 2320 S. Third St., Ste. #7, Jacksonville Beach, FL 32250.

"Sales Time Management", set of 5 cassettes, Management Research Systems Publications, 2320 S. Third St., Ste. #7, Jacksonville Beach, FL 32250, (904) 241-1721/241-1722.

"Time Trap", video, United Training Media, P.O. Box 718, 6633 West Howard Street, Niles, IL 60648-9990, (800) 558-9015 in IL (312) 647-0600.

"The Unorganized Manager", video, Video Arts Inc., P.O. Box 578, Northbrook, Illinois 60065, (800) 553-0091 in IL (312) 291-1008.

"The New Time Management", cassettes and guide, Nightingale-Conant Corporation, 7300 North Lehigh Avenue, Chicago, Illinois 60648-9951, (800) 323-5552.

"Your Seven Keys to Time Control," cassette tape, Alec Mackenzie, Mackenzie Building, 88 Salem St., Greenwich, NY 12834-0130, (518) 692-9626.

"T.I.M.E.-A Practical Approach to Managerial Time," South-Western Publishing Co., Consumer/Professional Products Dept., 5101 Madison Road, Cincinnati, OH 45227, (513) 527-6460.

"Setting Goals," workshop, Learning Dynamics, Inc. P.O. Box 323, Needham, MA 02192.

"Total Time Management", Audio-Cassette/Workbook Program. six cassettes and comprehensive workbook. American Management Assoc. Extension Institute; P.O. Box 1026; Saranac Lake, NY 12983-9986. (518) 891-5510.

"Managing Your Time", video VHS/Beta, 18 minutes, color; Films For The Humanities; PO Box 2053; Princeton, NJ 08543; (800) 257-5126.

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GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Technical Problem Solving

EXAMPLE:

A farmer was facing the dilemma of increasing expenses, decreasing receipts and a declining income. The problem had persisted for several years. What were his options? First, he could try to improve the effectiveness and efficiency of his farm, But he had been doing that for the past 30 years. He felt that he was as efficient and effective as he could get.

Second, he could quit farming. But job prospects for a fifty five year old man without other occupational experiences didn't look too promising. Third, he could investigate the possibility of vastly altering his farming operation. He had recently heard about an increasing market for "naturally grown" foods. Such foods are grown without commercial fertilizers and chemicals. Instead, natural manures are used for fertilizer, and select insects such as lady bugs and praying mantises are used as pesticides. Although much more labor intensive than the grain operation he had previously, his receipts increased and his expenses declined to now provide an income for him and his family.

DEFINITION:

Technical problem solving is the process of creating a change to bring extant conditions closer to desired conditions. (Pfeifer & Jones, 1983)

RATIONALE:

It is not uncommon to encounter problems sometimes many times within a day in one's occupational setting. To make the best use of the time allotted in a given day, it is wise to understand the importance of technical problem solving. Using a sequential process of problem solving will assist the individual in maximizing the available information in order to effectively solve a problem.

INTENDED LEARNER OUTCOME:

A learner who has mastered this competency will be able to:

1. Define and discuss the concept of technical problem solving.

2. Explain the basic factors one must possess in order to effectively problem solve.
3. List in proper sequence the steps of technical problem solving.
4. Justify the importance of following sequential steps in problem solving.
5. Utlize the various tools that are needed for technical problem solving.
6. Apply the strategies of technical problem solving to a hypothetical situation, list three or more solutions and evaluate each.
7. Apply various strategies for solving problems.
8. Define the terms commonly used in technical problem solving.

RESOURCES/REFERENCES (listed in order from best to least best for instructional purposes):

Krulik, Stephen & Rudnick, Jesse A. (1984). *A Sourcebook for Teaching Problem Solving*. Boston: Allyn & Bacon.

Rickards, Tudor. (1974). *Problem Solving Through Creative Analysis*. New York: Wiley.

Bransford, John & Stein, Barry S. (1971). *The Ideal Problem Solver: A Guide for Improving Thinking, Learning and Creativity*. New York: W. H. Freeman.

Ford, Leroy. (1971). *Using Problem Solving in Teaching and Training*. Nashville: Broadman Press.

Prince, George M. (1970). *The Practice of Creativity: A Manual for Dynamic Group Problem Solving*. New York: Harper & Row.

Grossman, Stephen R. (1984, December). Releasing Problem Solving Energies. *Training and Development Journal*, pp. 94-98.

Staff. (1986, August). Consciousness-Raising for Employees. *Pryor Report*, p. 4.

The Problem-Solving Game, Training House, Inc. P.O. Box 3090, Princeton, NJ 08543-3090, (609) 452-1505.

"What Went Wrong? The Art of Problem Solving," video, United Training Media, P.O. Box 718, 6633 West Howard Street, Niles, IL 60648, (800) 558-9015, in IL (312) 647-0600.

"Solving Problems in the Work Place, video, United Training Media, P.O. Box 718, 6633 West Howard Street, Niles, IL 60648-9990, (800) 558-9015, in IL (312) 647-0600.

"Creative Problem Solving," video w/workbook, American Management Association Extension Institute, P.O. Box 1026, Saranac Lake, NY 12983-9986, (518) 891-5510."

"Looking At It From Every Angle," video w/workbook, American Management Association, Customer Service Center, Nine Galen Street, Watertown, MA 02172, (800) 225-3215.

"The Effective Negotiator," video w/workbook, American Management Association, Customer Service Center, Nine Galen Street, Watertown, MA 02172, (800) 225-3215.

"Solutions: A Guide To Better Problem Solving," Order Department, University Associates, Inc., 8517 Production Avenue, San Diego, CA 92121, (619) 578-5900, $19.95.

Ellis, Julie L. *Creative Problem Solving Techniques*. Monroe, New York: Trillium Press.

Bagley, Michael T. *Using Imagery in Creative Problem Solving*. Monroe, New York: Trillium Press.

Bagley, Michael T. *Using Imagery to Develop Memory*. Monroe, New York: Trillium Press.

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GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Technical Operating Procedures

EXAMPLE:
Brandon K., the assistant manager at a department store, promptly locks the front doors at closing time. He knows that this must be done on time, just as the doors cannot be unlocked until exactly opening time. Should he unlock the doors before opening time and a customer walks in, slips on the wet floor and breaks a leg, the department store's insurance will not cover the accident as it would have if the customer would have come in after the store had officially opened.

DEFINITION:
Technical Operating Procedures are the written or oral instructions given to technicians as a method of ensuring/improving job performance.

RATIONALE:
It is important that every organization utilize technical operating procedures. More importantly, it is imperative that every employee understand thoroughly the technical operating procedures that are in existence in the organization in which they work.

Technical operating procedures allow the business to operate efficiently in that given most situations, employees know what procedures to follow. These systematic procedures protect not only the business but also the employee.

INTENDED LEARNER OUTCOMES:
A learner who has mastered this competency will be able to:

1. Discuss the importance of technical operating procedures.

2. Recognize the importance of technical operating procedures.

3. List three technical operating procedures for a hypothetical situation that would be beneficial to an organization.

RESOURCES/REFERENCES (listed in order from best to least best for instructional purposes):

Staff. (1986, October). Standard Operating Produres. Pryor Report, p. 10.

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DEVELOPMENTAL DRAFT
For discussion purposes only

GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Technical Safety

EXAMPLE:

According to Robert L. McCullough of the Ohio Division of Safety and Hygiene, a supervisor missed six weeks of work after breaking his arm in two places and crushing his elbow. Another employee developed a hernia from lifting. Yet another broke her wrist and ankle. One worker broke her thumb in a machine, while another was partially scalped by the machine she was using. What's unusual about these unfortunate accidents? They all happened in an office - not on a factory floor.

The need for safety in all occupational settings requires constant vigilance.

DEFINITION:

Technical safety refers to the development of attitudes and procedures that are conducive to establishing and maintaining a safe and a physically and mentally healthy work environment.

RATIONALE:

In 1985, there were 2 million job-related injuries in the United States costing $37 billion, an average of $18,650 per injury. Costs include lost wages, insurance, administsrative and medical expenses and indirect costs such as time lost by other workers.

The need for attention to occupational safety and health prompted federal legislation by the same name. But as our work society moves from an industrial to an information and service basis, the attention to occupational safety and health may decline. As heavy equipment is replaced by computer data, attention has begun to swing from physical health to mental health.

The technician must be aware of their responsibility to establish and maintain a safe and healthy work environment.

INTENDED LEARNER OUTCOMES:

A learner who has mastered this concept will be able to:

1. Define and describe the concept of technical safety and health.

2. Explain why it is necessary to practice safety procedures in one's occupational setting.

3. Describe five attitudes and five procedures that are conducive to a safe work environment in one's occupational setting.

RESOURCES/REFERENCES (listed in order from best to least best for instructional purposes):

"Safety: It's Your Responsibility", United Training Media, P.O. Box 718, 6633 West Howard Street, Niles, IL 60648-9990, (800) 558-9015 in IL (312) 647-0600.

Krames Communications, 312 90th St., Daly City, CA 94015-1898, (800) 228-8347, brochure.

Safety Training materials, DuPont Training Services, Room X-50370, Wilmington, DE 19801-9989, (800) 532-SAFE, ext. 100.

"Office Safety," videocassette, American Media, Inc., 1454 30th St., West Des Moines, IA 50265, (800) 262-2557.

"The Safety Secret," video, American Media, Inc., 1454 30th St., West Des Moines, IA 50265, (800) 262-2557.

Brown, Marianne P. (1987). *A Worker's Guide to Right to Know About Hazards in the Workplace*. UCLA.

Magnum, Garth L. (November, 1987). "Warning! This job may be hazardous to your life." *Personnel Administrator*, pp. 76-80.

Manji, James F. (September, 1987). "Right to know promotes health and safety." *Production Engineering*, pp. 62-70.

Stern, Sam & Forrest Gathercoal. (April, 1987) "Our Field's Most Basic Basic: Developing Safe Attitudes." *School Shop*, pp. 22-30.

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*1986. For more information contact Dr. Richard K. Hofstrand,Ph.D. Eastern Ill. University, Charleston, IL 61920; 217-581-3912.

GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Technical Stress

EXAMPLE:

An insurance office recently had a comprehensive computer system installed and implemented for their day-to-day needs. The office could now perform many tasks that they previously had contracted to another company. Payroll, budgeting and important reports could now be generated by the insurance company. The insurance company would realize the benefits and savings within a very short time.

There was a problem, however, with this new technology. It wasn't with the equipment itself, but with several of the employees. It seems that two groups of attitudes evolved with the arrival of the new equipment. One group had a difficult time accepting the new terms and procedures that the computer brought. The other group seemed to overidentify with the computer and adopted the computer's standards as their own. They even began to speak like machines, e.g. "interfacing" with people. These two groups of people were experiencing stress that was directly related to the arrival of the new technology.

DEFINITION:

Technical stress is the malady of adaptation caused by an inability to cope with the new technologies in a healthy manner. (Brod, 1984)

RATIONALE:

Technicians are confronted with many different kinds of stressful situations because of new technology. It is important that the technician learn to appropriately deal with stress in a constructive manner.

INTENDED LEARNER OUTCOME:

A learner who has mastered this competency will be able to:

1. Recognize the symptoms of technical stress.

2. Initiate personal actions to cope with stressful situations.

RESOURCES/REFERENCES (listed in order from best to least best for instructional purposes):

Brod, Craig. (1984). Technostress: The Human Cost of the Computer Revolution. Reading: Addison-Wesley.

Kindler, Herbert S. (1984, June). Time Out For Stress Management. *Training and Development Journal*. pp. 64-66.

Adams, John D. (1980). *Understanding and Managing Stress: A Facilitator's Guide*. San Diego: University Associates.

Cooper, Cary L. (1981). *The Stress Check: Coping With the Stresses of Life and Work*. Englewood Cliffs: Prentice Hall.

Kearns, Joseph L. (1973). *Stress in Industry*. London: Priory Press.

Klein, Stuart Marc. (1971). *Workers Under Stress: The Impact of Work Pressure on Group Cohesion*. Lexington: University Press of Kentucky.

Staff. (1986, August). To Your Health. *Pryor Report*, p. 9.

"Managing Stress in The Sales Management Environment," set of 5 cassettes, Management Research Systems Publications, 2320 S. Third St., Ste. #7, Jacksonville Beach, FL 32250, (904) 241-1721/241-1722, $35.00.

"Strategies For Stress-Free Living," cassettes, Nightingale-Conant Corporation, 7300 North Lehigh Avenue, Chicago, Illinois 60648-9951, (800) 323-5552, $45.00.

"Listen and Learn to Manage Stress!" cassette, $7.95, Shamrock Press, Div. of Karl Albrecht & Assoc., 1277 Garnet Avenue, San Diego, CA 92109, (619) 272-3880.

"Stress Reduction" video, Flashcourse, Van Dyck Communications, 832 Folsom Street, San Francisco, CA 94107, (415) 546-1700.

"The Time Bomb," 16mm or video, United Training Media, 6633 W. Howard Street, Niles, IL 60648, (800) 558-9015, in IL call collect (312) 647-0600.

"What The World Dishes Out," 16mm or video, United Training Media, 6633 W. Howard Street, Niles, IL 60648, (800) 558-9015, in IL call collect (312) 647-0600.

"What You Bring On Yourself," 16mm or video, United Training Media, 6633 W. Howard Street, Niles, IL 60648, (800) 558-9015, in IL call collect (312) 647-0600.

"Stress Management Handbook, Vol. 1 & 2," handbook, Whole Person Press, 1702 E. Jefferson Street, P.O. Box 3151, Duluth, MN 55803, (218) 728-6807, $19.95 each.

"Understanding and Managing Stress," workbook, American Management Association Extension Institute, P.O. Box 1026, Saranac Lake, NY 12983-9986, (518) 891-5510.

"Understanding and Managing Stress," facilitator's guide, workbook, book of readings, Order Department, University Associates, Inc., 8517 Production Avenue, San Diego, CA 92121, (619) 578-5900, $55.95.

"Living with Stress," video, Britannica, Training and Development, 1488 South Lapeer Road, Lake Orion, MI 48035, (800) 554-6970, in MI call collect (313) 693-4232.

"Stress: You're in Control," video with training leader's guide and desk reminder cards, American Media Incorporated, 1454 30th Street, West Des Moines, IA 50265.

"Dealing with Stress", video VHS/Beta, 39 minutes, color; FILMS FOR THE HUMANITIES, PO Box 2053, Princeton, NJ 08543; (800) 257-5126.

"Understanding and Managing Stress", Audio-cassette/Workbook Program; six information-packed cassettes and comprehensive workbook; American Management Assoc. Extension Institute; P.O. Box 1026; Saranac Lake, NY 12983-9986; (518) 891-5501.

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*1986. For more information contact Dr. Richard K. Hofstrand,Ph.D. Eastern Ill. University, Charleston, IL 61920; 217-581-3912.

GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Technical Teamwork

EXAMPLE:

Wayne Gretzky isn't the fastest, strongest or most powerful hockey player today, but he is one of the greatest. His greatness comes not from his hockey skills but from his ability to work together with his team members toward their goal of winning the game. He blends in effectively with his teammates by constantly working together with them. (Berger, 1985)

DEFINITION:

Technical Teamwork is working together in an efficient and effective manner toward a shared goal. It is the sharing of talent through cooperative action.

RATIONALE:

A unique difference between Japanese and American behavior is that the Japanese are much more group oriented than Americans. Japanese technicians take their rewards from group achievement rather than individual achievement. To the Japanese, success is measured by how well a technician is a team player. (Christopher, 1986)

Teamworking is an essential element of worker productivity. To accomplish goals within an organization, workers must be able to work productively with each other. Realizing this, a major concern among employers today is achieving their goals through teamworking.

Teamworking will also improve communication skills because of the requirement of being able to communicate effectively within a team. Teamworking encourages technicians to be willing to break with convention to get the job done. Because of this, personal creativity may be enhanced.

INTENDED LEARNER OUTCOME:

A learner who has mastered this competency will be able to:

1. Describe the concept of teamwork and understand how it can be helpful in an occupational setting.

2. Describe the benefits of successful team effort.

3. Define the differences between production teams and problem solving teams.

4. Explain the characteristics of a successful team.

5. Explain the factors that can limit effective teamwork efforts.

6. Explain the behaviors of each member during a team effort.

7. Explain the functions of each member during teamwork.

8. Explain the individual functions of each team member within a team.

9. Explain how teams may be organized internally.

10. Describe and explain the normal stages of team development.

11. Define the terms commonly associated with teamwork.

RESOURCES/REFERENCES (Listed in order from best to least best):

Slavin, Robert E. (1980). Using Student Team Learning. Baltimore: The Johns Hopkins University.

Wean, Raymond John. (1969). Teamwork and Technology; The Story of Wean United. New York: Newcomen Society in North America.

Christopher, Robert C. (1986, November). (Interview with Bottom Line/Personal), Bottom Line, p. 1.

Suzawa, Soichi, (1985, May). How the Japanese Achieve Excellence. Training and Development Journal, pp. 110-117.

Berger, Michael A. (1985, March). The Technical Approach to Teamwork. Training and Development Journal, pp. 53-56.

Hall, James; Leidecker, Joel; and Posner, Barry. (1984, July). Will Your Workers Sing the Company Song? Training and Development Journal, pp. 68-70.

Newman, Betsy. (1984, February). Expediency as Benefactor: How Team Building Saves Time and Gets the Job Done. Training and Development Journal, pp. 26-30.

"One Small Step", video, Cally Curtis Co., 1111 N. Las Palmas Avenue, Hollywood, CA 90038-9981, (213) 467-1101.

"Team Building: A Blueprint for Success," video, American Management Association, Order Department, 85 Main Street, Watertown, MA 02172--9990, (800) 225-3215, in MA (617) 926-4600, $595.00.

"Developing Strategies For Teamwork," video, Bureau of Business Practice, 24 Rope Ferry Road, Waterford, CT 06386, (800) 243-0876.

"Effective Team Building," video w/workbook, American Management Association Extension Institute, P.O. Box 1026, Saranac Lake, NY 12983-9986, (518) 891-5510.

"Making Meetings Work: A five-step plan," film or video, Britannica films--Encyclopedia Britannica Educational Corporation Business and Industry Division, 780 South Lapeer Road, Lake Orion, MI 48035, (800) 554-6970, in Michigan (313) 693-4232.

"Winning Through Teamwork," cassettes, Nightingale-Conant Corporation, 7300 North Lehigh Avenue, Chicago, IL 60648-9951, (800) 323-5552, in IL (800) 972-5855.

"Teamwork," video with Jack Whitaker, United Training Media, P.O. Box 718, 6633 West Howard Street, Niles, IL 60648-9990, (800) 558-9015, in IL (312) 647-0600.

"Effective Management Communication," cassettes and workbook, Management Research Systems Publications, 2320 S. Third St., Ste. #7, Jacksonville Beach, FL 32250, Stop A, (904) 241-1721/241-1722.

The Game of Transactional Analysis," Training House,Inc., P.O. Box 3090, Princeton, NJ 08543-3090, (609) 452-1505.

"We're on the Same Team, Remember?" film, Roundtable Film & Video, 113 North San Vicente Boulevard, Beverly Hills, CA 90211-9965.

Teamwork Effectiveness/Attitude Measurement, A Peer Assessment Tool for Building and Reinforcing Teamwork. Education Research, 370 Lexington Avenue, 27th Floor, New York, NY 10017.

"Work Smarter as a Team," cassette tape, Alec Mackenzie and Associates, Inc., Mackenzie Building, 88 Salem Street, Greenwich, NY 12834-0130, (518) 692-9626.

"Tango Teambuilding," film/video, Monad, 163-60 22 Avenue, Whitestone, NY 11357 (718) 352-2314.

"Working Together Works," video, Dartnell, 4660 Ravenswood Avenue, Chicago, IL 60640-9981.

"Working Together--Works," United Training Media, 6633 W. Howard St., Niles, IL 60648.

Team-Work & Team-Roles Inventory, Organization Design and Development, 101 Bryn Mawr Ave., Suite 310, Bryn Mawr, PA 19010.

"The Superteam Solution: Successful Teamworking in Organizations," Order Department, University Associates, Inc., 8517 Production Avenue, San Diego, CA 92121, (619) 578-5900, $15.95.

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*1986. For more information contact Dr. Richard K. Hofstrand, Ph.D. Eastern Ill. University, Charleston, IL 61920; 217-581-3912.

GENTEC/teamwork

GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Job Creation

EXAMPLE:

Maria was complaining to her friend that she enjoyed her job as a waitress in a local restaurant, but was getting a little bored with it for reasons she just couldn't identify. It wasn't the hours, nor the conditions. She was just a little bored. The next day at work she overheard some customers at the restaurant talking about the delicious bread that was served there with every meal. The customers wished that they could buy whole loaves of the bread to take home with them.

Maria thought about the statement for a little while and then realized that it might prove profitable for the restaurant to market whole loaves of bread and it may add a bit of variety to her job if she would be in charge of delivery. After obtaining approval from all who would be involved with the new procedures, Maria delivered the first order in two weeks. She found that she enjoyed this new dimension to her job. She still worked the same amount of hours, but enjoyed those hours more.[1]

DEFINITION:

Job creation is initiating new roles, functions and/or procedures by thinking about one's own talents, skills, interests and capacities for productive involvement in a work setting.

RATIONALE:

Most people are accustomed to defining work in traditional functions, in traditional employer/employee settings and relationships. Individuals need to understand realistically and knowledgeably the opportunities to create and design new ideas and activities in their technical setting.

INTENDED LEARNER OUTCOME:

A learner who has mastered this competency will be able to:

1. Describe the benefits of job creation.
2. Describe an individual's involvement in the world of work.
3. Generate three or more alternatives to a hypothetical job setting.
4. Analyze one's current or previous technical setting and generate three or more alternatives or new dimensions to that responsibility.

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*1986. For more information contact Dr. Richard K. Hofstrand,Ph.D. Eastern Ill. University, Charleston, IL 61920; 217-581-3912.

RESOURCES/REFERENCES:

[1]"Job Creation: Creative Materials, Activities, & Strategies for the Classroom." 1982. Joan Franklin Smutny, Director. Funded by the Illinois State Board of Education.

Jacobson, Betsy and Beverly Kaye (1988, April) "How Do You View Your Work." Training and Development Journal, pp. 43-47.

GENTEC/jobcreate

GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Productivity

EXAMPLE:

A carpenter's assistant in a small woodworking shop was faced with an assignment. He was to construct in one hour a shallow, square box to hold a phonograph turntable by following the sketches made by his boss and the customer.

The assistant knew the mechanics of woodworking but was faced with the problem of having to build the project in no more than one hour. The price was based on the materials costing one third of the estimate, the worker's pay another third and the final third would go back to the shop as profit. The assistant knew that if he took too long, the shop wouldn't make any money. If the assistant made a mistake and had to start over with new material, the shop would not make any money. He knew he had to do it right the first time within a reasonable amount of time. He knew he could produce, but wondered if he could be productive.

DEFINITION:

Productivity involves forming positive attitudes towards increasing one's own job output.

RATIONALE:

Why should a person be more productive? Why should someone even be concerned with being productive? Everyone uses a portion of their time to produce a good or service. Preparing a meal is "producing." Other examples are raising vegetables in a garden (a good), being a foster parent (a service), and teaching someone to tole paint (a service). Whether in economic (work) life or in personal life, one thing is true: YOU CAN ALWAYS BE MORE PRODUCTIVE.

We should be interested in improving productivity. Since most people don't want to work harder, they want to work "easier." Even though most of us want to work "easier", we still want to produce the same amount. It's not that we're lazy; we're just ingenious. We search for ways to do the same thing with less effort, in less time, with less trouble, with fewer resources. We want to produce as much yet produce it with fewer inputs. That's called "increasing your human productivity."

When we realize we have time, energy and resources left over, we begin to increase the quantity and improve the quality of what we produce. And that increase in productivity produces personal rewards such as money, status and positive feelings about ourselves and others.

INTENDED LEARNER OUTCOMES:

A learner who has mastered this concept will be able to:

1. Describe the importance of improving occupational productivity.

2. Utilize personal skills which can improve personal productivity.

3. Initiate and use these skills on their own and without external impetus.

4. Display positive attitudes toward personal productivity by taking responsibility, initiating action and acknowledging rewards for increased human productivity.

RESOURCES/REFERENCES (listed in order from best to least best for instructional purposes):

Vough, Clair F. & Askell, Bernard. (1979). Productivity, A Practical Program for Improving Efficiency. New York: AMACOM.

McBeath, Maurice Gordon. (1974). Productivity Through People: A Practical Guide To Improvement. London: Business Books.

Staff. (1986, October). Cleanliness Is Next To Productivity. Pryor Report, p. 9.

"Making People Productive," ASTD Publishing Service, P.O. Box 4856, Hampden Station, Baltimore, MD 21211.

"Peak Performance," video, Nightingale-Conant Corporation, 7300 North Lehigh Avenue, Chicago, IL 60648-9951, (800) 323-5552.

"People and Productivity: We Learn from the Japanese," video, Britannica, Training and Development, 1488 South Lapeer Road, Lake Orion, MI 48035, (800) 554-6970.

"Autonomous Production Groups: Responsibility Shared", video, Britannica, Training and Development, 1488 South Lapeer Road, Lake Orion, MI 48035, (800) 554-6970.

"Productivity of Japanese Industry", video, Britannica, Training and Development, 1488 South Lapeer Road, Lake Orion, MI 48035, (800) 554-6970, in MI call collect (313) 693-4232.

"High Productivity-How Matsushita Does It", video, Britannica, Training and Development, 1488 South Lapeer Road, Lake Orion, MI 48035, (800) 554-6970, in MI call collect (313) 693-4232.

Peak Performers, videocassette workshop; one 85-minute videocassette program (3 videocassettes), one detailed 16-page leader's guide, ten 24-page participant workbooks; Purchase: $950, 3-day rental: $250. MTI Film & Video; 108 Wilmot Road; Deerfield, IL 60015-9925; (800) 621-2131, In Illinois & Alaska Call Collect (312) 940-1260.

"The Productivity Sourcebook", Richard W. Beatty, H. John Bernardin, and James E. Nickel, Editors. (1987). HRD Press. 467 pages. ASTD Publishing Service; P.O. Box 4856; Hampden Station; Baltimore, MD 21211; (703) 683-8129.

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*1986. For more information contact Dr. Richard K. Hofstrand,Ph.D. Eastern Ill. University, Charleston, IL 61920; 217-581-3912.

GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Worker Initiative

EXAMPLE:

Do you want to make money? Lots of money? Teach employers how to motivate their employees. Or better yet, motivative a company's employees for them. The problem is simple: "Our employees are apathetic!" The solution is more difficult: "Please motivate our staff." Even the Egyptions had to whip their slaves into building the pyramids. (Is this known as whipping up a frenzie?)

DEFINITION:

Worker initiative is the desire to exert additional effort in accomplishing occupational tasks and goals; "going the extra mile."

RATIONALE:

Motivation is caused by a person pursuing their own goals; Apathy is caused by asking a person to pursue someone else's goals. The problem with worker initiative is that some people have no goals. More precisely, the problem is that some people have a lack of achievement motivation, i.e., they are not energized to achieve their own goals.

The lack of achievement motivation in the American labor force is common, largely because employers ask "not what your company can do for you. Instead, they ask "what can you do for your company. Paraphrased, that's "don't pursue your goals; pursue ours."

Technicians need to understand the concept of achievment motivation, the act of pursuing one's own career goals and the beneficial results of taking initiative in the work place.

INTENDED LEARNER OUTCOMES:
A learner who has mastered this competency will be able to:

1. Describe the nature and theory of achievment motivation, and relate that concept to a person's occupational environment and career.

2. Analyze one's own level of achievement motivation.

3. Relate the feelings of the need to achieve and resultant feelings of accomplishment.

RESOURCES/REFERENCES (listed in order from best to least-best for instructional purposes):

"Personal Initiative," videotape, Flashcourse, Van Dyck Communications, 832 Folsom Street, San Francisco, CA 94107, (415) 546-1700.

"The Desire To Win," film, Producers International Corporation, 3921 N. Meridian Street, Indianapolis, IN 46208-9990, (317) 924-5163.

Spice, Martha B. and Susan Kopperl. (1984, May) "Are Your Trainees Willing." Training and Development Journal, pp. 30-32.

Jacobson, Betsy and Beverly Kaye. (1988, April) "How Do You View Your Work." Training and Development Journal, pp. 43-47.

Kazutoshi, Koshiro. (1980) "Perceptions of Work and Living Attitudes of the Japanese." Japan Quarterly, Vol. XXVII, No. 1, January-March, pp. 46-55.

Garfield, Charles A. (1987, April). Peak Performance in Business. Training and Development Journal, p. 54-59.

"Peak Performers," videocassette, Coronet/MTI Film & Video, 108 Wilmot Road, Deerfield, IL 60015-9925, (800) 621-2131, in IL call collect (312) 940-1260.

"Peak Performance," video, Ready Reference Press, P.O. Box 5249, Santa Monica, CA 90405, (800) 424-5627.

"Creating Excellence," leader's guide, MTI Film & Video, 108 Wilmot Road, Deerfield, IL 60015, (800) 621-2131, in IL call collect (312) 940-1260.

"Creating Excellence," participant's workbook, MTI Film & Video, 108 Wilmot Road, Deerfield, IL 60015, (800) 621-2131, in IL call collect (312) 940-1260.

"Peak Performers: The New Heroes of American Business," leader's guide & participant's guide, MTI Film & Video, 108 Wilmot Road, Deerfield, IL 60015, (800) 621-2131, in IL call collect (312) 940-1260.

"Developing Peak Performers," video, Presented by Doug R. MacKay, President, Glen Douglas, Inc., San Clemente, CA. Order from ASTD Order Department, 1630 Duke Street, P.O. Box 1443, Alexandria, VA 22313.

Calano, James; Salzman, Jeff. Real World 101. New York: Warner Books. CareerTrack, (303) 440-7440.

Peters, Tom; Austin, Nancy. A Passion For Excellence. New York: Random House. CareerTrack, (303) 440-7440.

Bliss, Edwin. audio tape. Getting Things Done. CareerTrack Publications, Boulder, CO (303) 440-7440.

Milteer, Lee. audio tape. Success Self-Programming. CareerTrack Publications, Boulder, CO (303) 440-7440.

Tracy, Brian. audio tape. The Psychology of Achievement. CareerTrack, Chicago, IL. Nightingale-Conant Corporation. (303) 440-7440.

Garfield, Dr. Charles. video tape. Peak Performance. CareerTrack, Chicago, IL. Nightingale-Conant Corporation. (303) 440-7440.

Ziglar, Zig. Goals. CareerTrack, Nightingale-Conant Corporation. Chicago, IL. (303) 440-7440.

Gittelson, Bernard and the Institute for Advanced Psychology. "Perceptron-Develop Your Intuitive Powers." Teaching unit with comprehensive booklet and instruction booklet. Organization Design and Development; 101 Bryn Mawr Ave.; Bryn Mawr, PA 19010; (215) 525-9505.

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FINAL REPORT

GENTEC - PHASE II: A CURRICULUM AND INSTRUCTIONAL MATERIALS ON TOPICS OF GENERIC TECHNOLOGY

VOLUME II - INSTRUCTIONAL MODULES
APPENDICES A - D

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Supported in part by the Illinois State Board of Education
Department of Adult, Vocational and Technical Education

July, 1988

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APPENDIX A
INSTRUCTIONAL MODULE ON TECHNICAL TEAMWORK

DRAFT - For Field Testing Purposes Only

Project GENTEC
Generic Technical Competency

Instructional Module

on

TECHNICAL TEAMWORK

Prepared by:
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1987
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Developed in part with funding from the
Illinois State Board of Education's
Department of Adult, Vocational and Technical Education.

INTRODUCTION

What is the difference between the sports in Column A from those in Column B?

Column A	Column B
Basketball	Golf
Hockey	Pole vaulting
Football	Archery
Baseball	Swimming

The sports in Column A require teamwork. Each team member must be committed to working together to achieve the team's goal--to win. The roles and responsibilities of each team member are clearly identified, making teamwork effective. Participants in sports from Column B do not need to have any roles and responsibilities clarified; the only person participating in the sport is the participant.

List three additional sports which require teamwork:

1.

2.

3.

Working together does not come naturally to the members of sports teams. To become efficient and effective team members requires training. This is also true for you, as a technician, in an occupational setting. Practicing the behaviors and processes that are necessary for effective teamwork will enable you to function better in your occupational setting.

People are more productive when they pool their resources. Teamwork involves team members working together in an efficient manner toward a mutually agreed upon goal or objective. There are two types of teamwork: one is concerned with unit output, while the other is concerned with group brainstorming for solutions to a given problem. It is the intent of this module to describe teamworking in production teams as opposed to problem-solving teams. This module will help you understand the process of teamwork, and will familiarize you with the attitudes and behaviors necessary for teamwork.

When you complete this instructional module, you will be able to:

* Describe the concept of teamwork.

* Explain the benefits of successful team effort.

* Outline the differences between a production team and a problem-solving team.

* Explain the characteristics of a successful team.

* Explain the factors that can limit effective teamwork efforts.

* Discuss how teams may be organized internally.

* Specify the effective behaviors of each team member.

* Explain the functions of each team member.

* Explain the unproductive behaviors of a team member.

* Describe and explain the normal stages of team development.

* Analyze how decisions are made within teams.

* Summarize why consensus building is sometimes difficult in teams.

* Define the terms commonly associated with teamwork.

This module is designed to provide answers to the following key questions:

1. What is teamwork?
2. Why is it important to learn about teamwork?
3. What are differences between production teams and problem-solving teams?
4. What are the benefits of a successful team effort?
5. How can teams be organized internally?
6. What are the stages of team development?
7. What must each member do to keep the team working effectively?
8. What are the effective behaviors of a team member?
9. What are the characteristics of a successful team?
10. What behaviors are unproductive of team members?
11. How are decisions made within teams?
12. Why is consensus building sometimes difficult in teams?
13. What factors limit effective teamwork efforts?
14. What terms are commonly associated with teamwork?

Alana H. is a "phone person" at Rico's, a restaurant which specializes in pizza.

"Talk about teamwork! The frantic pace at the pizza restaurant where I work doesn't allow anything but teamwork.

At Rico's, we make only pizza. That makes it a little easier in that we can concentrate solely on coordinating our efforts to make the pizza pies. Also, we don't have sit-down dining here in the store; all our orders are deliveries.

Basically, we have five different types of workers here: the phone person, pizza makers, oven tenders, routers, and delivery people. Each person must support the other person to keep operations flowing smoothly. It is the only way to guard against being snowed under with orders.

Typically, a customer calls and talks to the phone person. The phone person will then give the order to the pizza maker who will prepare the pizza and place it in the oven within one minute. The oven tenders are required to load one pizza and unload another within fifteen seconds and then slice and box the pizza. While all of this happens, the router is directing the deliveries so that the delivery person doesn't backtrack across town. The delivery person waits for the finished pizzas, and then takes them to the customer following a preset route.

It is important to us and our manager that we hustle and work together. If we don't, our customers would be dissatisfied, the restaurant's profits would drop, and our job security would be threatened.

It's easy to see why we depend so much on teamwork. Two hands are better than one, and we produce the desired results. We're the #1 pizza restaurant in town, and we want to stay there."

---

1. WHAT IS TEAMWORK?

Teamwork is the process of two or more people joining forces in pursuit of a common goal or objective. It involves coordinating the activities of team members so that they work more effectively and accomplish more together than individually. This coordination of activities is a plan to which each member of the team makes a unique and complementary contribution.

If it is to be considered "successful," a typical team relies on the efforts and expertise of the members to achieve the specified goals and objectives that were decided upon before any team effort began. The Japanese have a saying that sums up teamwork: "None of us is as smart as all of us." They understand that a combined effort of the team can be more productive than the effort of one person.

As Alana H. described, the team of pizza makers is successful because team members understand their own roles and responsibilities. In order for the entire operation to be successful, each team member must perform his or her individual role correctly. They have learned that they are not only accountable for their actions but that someone else's job success also depends on them.

Jenna H. is the Director of the Emergency Room at a large hospital.

"Code Blue! Two simple words that always make my heart skip a beat. I was planning to review a patient's chart but decided quickly that I would have to look at it later because there was an emergency, and someone needed me.

The patient being admitted was a man in his 60s who was a victim of respiratory failure. It was a good thing all of us in the emergency room were well trained in teamworking. Our skills were about to be put to the test.

There were many technicians present in the emergency room, each ready to act. One staff nurse was taking the patient's vital signs, one staff nurse was inserting the I.V., while another was inserting the urinary catheter. The lab technician was drawing blood, and a respiratory therapist was taking out arterial blood gases. Another respiratory therapist was inserting the endo-tracheal tube while her co-worker started the ambu-bag.

The EKG technician was there ready to start the EKGs when given the signal. The nursing supervisor was standing by quietly taking notes as events occurred, and a representative from the pharmacy arrived to advise the emergency room team about the special medication that the patient required. As always, the attending physician and the emergency room physician were present.

It can get crowded in the emergency room with that many people. But each technician understands the concept of teamwork and works cooperatively. We understand our roles and responsibilities clearly and appreciate what the others are doing. Our major concern is the patient's health, and if we are not committed to working cooperatively together, the patient will suffer."

----

2. WHY IS IT IMPORTANT TO LEARN ABOUT TEAMWORK?

Today's technicians are more concerned than ever about their job qualifications. Besides exhibiting superior performance, enthusiasm, and self-confidence in an occupational setting, a technician needs other skills to help insure job success. One of those necessary skills is teamworking. Becoming familiar with the process of teamworking will better qualify a technician for future jobs.

Teamworking is a structured group process that is used in many occupations. The technician who becomes familiar with teamworking will be less hesitant when asked to work with other team members in future occupational settings.

Jeremy F. is a member of a customer support team for a leading computer manufacturing firm.

"The customer support team that I belong to has one objective--to satisfy the customer as soon as possible. When the computer system breaks down, the customer always wants it fixed yesterday.

My team consists of a specialist from each division of the company: a tape drive specialist, an operations specialist, a communications specialist, and a CPU (central processing unit) specialist. Since we cover so many specialty areas, we can troubleshoot a problem usually within a short time.

Take the day that a data processing manager called in to say that her main disk drive was not giving information as it should. The field engineer was the first person to work on the problem. The field engineer decided that it was a problem that he could not solve, so he passed it on to our team. My team worked together to determine the problem. After all of us had shared our opinions, we agreed that the data processing manager should order an entirely new disc drive. The other disk drive was defective, and it would be too costly to repair it.

Since the disk drive was crucial to a data processing department's daily operations, the manager needed a new disk drive immediately. The order was first called in to the manager's sales representative, who then turned the order over to the team in the ordering department.

A price quote was given to the sales rep who checked it for accuracy. After verification, the quote was sent to the data processing manager for her signature, which signals acceptance. Upon receipt of the signed quote, the order-processing administrator called the factory to inform them that this was a rush order and to begin processing. The equipment was shipped that afternoon, and the customer received it within 24 hours.

By working together to help the customer, we quickly solved the problem. As a result of the way we serviced this account, the customer ordered an entire system from us for their new building."

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3. WHAT ARE THE DIFFERENCES BETWEEN PRODUCTION TEAMS AND PROBLEM-SOLVING TEAMS?

A production team is concerned with unit output. An example of a production team is the gas station attendant who fills the customer's vehicle with the desired amount of fuel. At the same time the vehicle is being fueled, another attendant cleans the windshield of the vehicle, while the first attendant begins to check the oil level. This is a simplified example of teamworking, but the concept is evident: two people, members of the same group, join forces to pursue their common goal of waiting on the customer.

A problem-solving team has the goal of creating new products, ideas, or solutions. For example, a group of people is called together by upper management to determine the cause of the recent decline in productivity in one of the assembly lines. This group of people would form a team to carefully analyze the situation and brainstorm for possible solutions.

The customer support team to which Jeremy F. belongs typifies a problem-solving team. Their objective is not to produce something tangible but to troubleshoot problems. Compare their objective to the Ordering Department, a production team whose objective was to fill the order for the new equipment. Both teams were producing--but in different ways.

It is the intent of this module to describe teamworking in production teams.

Jake K. is a member of a pit crew for a local race car driver.

"If anyone had told me when I was sixteen that I would be able to see a car re-fueled, tires changed, and ready for racing action again in 12-13 seconds, I would have said he was crazy. But with a team of people who are willing to work together, it is an every day occurrence in the car racing world.

A pit crew team for a typical race has about six members. The re-fueler is in charge of attaching the fuel hose to the car and filling it with a pre-determined amount of fuel. Because the fuel is put into the car so quickly, there is someone standing by with a can to catch any that spills over. This same person attaches the air hose to the top of the car which enables the jacks to lift the car so the tires can come off easily and quickly.

Two people are on each side of the car to replace the tires. A team member is also available to hold a shroud over the turbo to divert the intense heat. While all of this is happening, a pit manager is overseeing the entire operation and lending a hand when necessary.

A successful race car driver depends heavily on the pit crew. Each team member must clearly understand and complete his own tasks. Otherwise, they would get in each other's way and delay the driver.

All of us understand that our objective is to revitalize the car and get it back out on the track and into the race. Our individual roles and responsibilities are clear in our minds, too. They have to be or the car couldn't be on the track again in thirteen seconds."

4. WHAT ARE THE BENEFITS OF A SUCCESSFUL TEAM EFFORT?

Successful teamworking can be beneficial to you in an occupational setting in many ways. Here are a few:

FEELINGS OF CAMARADERIE

*A successful team depends on cooperation between members. This cooperation will result in feelings of good will and support among members.

PERSONAL SATISFACTION

*Involvement with an innovative concept will be personally rewarding to team members.

INCREASED PRODUCTIVITY

*Because of the exchange of constructive criticism and comments, work processes become clearer to each team member and more work gets done. This increased productivity benefits the company and helps to ensure job security.

FEELINGS OF AUTONOMY

*If the teamworking effort is successful, teamwork increases individual feelings of responsibility and self-determination. The team will often be given the power to make changes in procedures because it knows the situation better than others.

ESTABLISHED TIMETABLES

*A successful team has clearly established timetables. The team knows how they should be progressing at all times because of the established timetables. Team members also allow sufficient time for periodic evaluation of their progress. They understand the importance of careful evaluation.

EFFECTIVE TIME MANAGEMENT

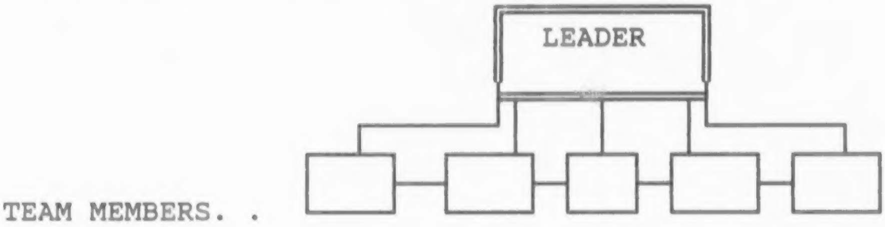
*Careful identification of each team member's roles and responsibilities will avoid wasted effort. Team members will not overlap duties because each role has been clearly defined.

5. HOW CAN TEAMS BE ORGANIZED INTERNALLY?

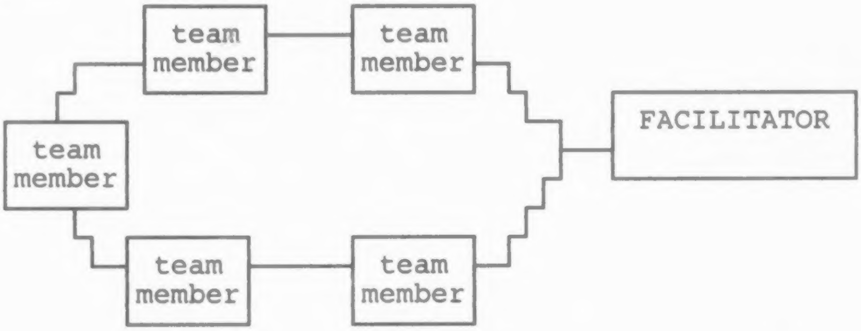
One type of team organization is called pyramidal. In this team, there is a definite hierarchy of roles. A team leader is present and is obviously labeled to the rest of the team. Also, each member understands his or her own individual role as well as the role of the leader. The leader's role is three-fold:

1. He or she stretches the abilities of the team members by encouraging educated risk-taking among the team members,
2. Keeps the channels of communication open and clear, and
3. Delegates responsibility when necessary.

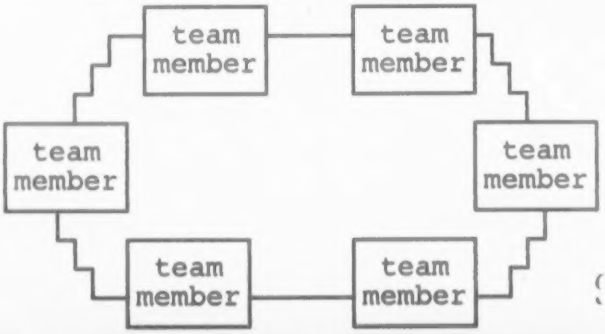
The pyramidal team is illustrated below:


LEADER
TEAM MEMBERS. .

A second type of organization is the facilitated team. This team has a facilitator whose main concern is keeping the team's efforts directed towards its goals and who encourages discussion. This person usually is not a member of the team. The facilitated team is illustrated below:


team member
team member
FACILITATOR
team member
team member
team member

A third type of organization is called a collegial team in that each member is a leader whenever the situation calls for someone to take charge. Each member realizes that he or she at any time, may lead the team. The collegial team is illustrated below:


team member
team member
team member
team member
team member
team member

6. WHAT ARE THE STAGES OF TEAM DEVELOPMENT?

Basically, five stages of team development are evident. Teamwork specialist B. W. Tuckman[2] best describes them as forming, storming, norming, performing and adjourning. Look at each stage to better understand them.

insert a graphic depicting the five stages

FORMING Forming is the first stage of team development. During this stage, team members become acquainted with each other and set goals and objectives.

STORMING Conflict will emerge naturally during the storming stage. Each member should view this conflict as constructive conflict. This type of conflict serves a purpose in that it helps to clarify the situation to all of the team members. The storming stage is a time for team members to openly acknowledge and confront, rather than ignore, the conflict. It is important that team members feel free to communicate any feelings, positive or negative. Suppressing any diverse feelings only hampers further development of the team.

NORMING The norming stage is one of cooperation. Conflict has been acknowledged and dealt with, and each member respects others' viewpoints. Team members now are ready to get involved with each other and give needed support. They have learned to appreciate the fact that feedback is a necessary element of teamwork.

PERFORMING At this point, team members are able to work together cooperatively. With the team's goals clearly in mind, team members are now actively pursuing their final objective.

ADJOURNING In this stage, major tasks have been completed and the original goals and objectives have been attained. At this time, the team may make an evaluation of their efforts for modifying and/or improving upon them.

7. WHAT MUST EACH MEMBER DO TO KEEP THE TEAM WORKING EFFECTIVELY?

Each team member must assume those roles which enhance other members' feelings of personal worth and encourages them to participate in the team's activities. Facilitating team action, these maintenance functions are:

HARMONIZING Team members attempt to reconcile disagreements, reduce tension, and encourage people to explore differences in the harmonizing function.

GATE KEEPING Keeping communication channels open is part of gate keeping. Also, this involves facilitating the participation of others and suggesting procedures that permit sharing of ideas.

CONSENSUS TESTING This function involves sending up a "trial balloon" to test a possible conclusion. Team members may find themselves asking each other, "Can we live with this solution?" The team is nearing an agreement at this time.

ENCOURAGING This type of behavior encourages members to work cooperatively with each other. Displaying signs of friendship, warmth, and acceptance of the contributions of others is functioning in an encouraging role.

COMPROMISING When a team member offers an idea that is rejected by the consensus of the group, he or she should be able to offer a compromise to the original idea, or drop the idea if an error has been made.

8. WHAT ARE THE EFFECTIVE BEHAVIORS OF A TEAM MEMBER?

Each member, to be a valuable team member, will exhibit a variety of behaviors during a team effort. Behaviors are displayed by all team members. Any team member may utilize these behaviors when the situation requires such action.

INITIATING Team members are initiating when they propose tasks, goals, or objectives to be completed by the team. They will also define the problem and possibly suggest a course of action to accomplish the team objective.

INFORMING Input is provided to the team concerning facts of the situation. The exchange of opinions of each member is common at this time.

CLARIFYING This behavior further explains ideas or suggestions of other team members. Issues that have been brought before the team are further elaborated and clarified.

SUMMARIZING Team members pull together related ideas to coordinate the team objective when summarizing. Previously stated suggestions may be restated at this time to help the team's efforts.

REALITY TESTING Critically evaluating a suggested idea may involve testing the idea in two ways: testing it against data and/or actually trying the idea out to determine if it is workable.

9. WHAT ARE THE CHARACTERISTICS OF A SUCCESSFUL TEAM?

Luck does not determine team success. Successful teams consist of members who possess definite attitudes and behaviors in order to be successful. A closer look reveals these attitudes...

EACH TEAM MEMBER IS COMMITTED TO THE TEAMWORK PHILOSOPHY.
They must be committed to the concept that working together cooperatively leads to increased and improved output.

EACH TEAM MEMBER UNDERSTANDS THE GOALS OF THE TEAM.
Each team member must have a clear understanding of the team goals to keep the team from straying from their original objective.

EACH TEAM MEMBER UNDERSTANDS THEIR OWN INDIVIDUAL ROLES AND RESPONSIBILITIES AS WELL AS OTHER TEAM MEMBERS'.
Confusion over each member's roles and responsibilities will cause the progress of the team to stagnate.

EACH TEAM MEMBER IS WILLING TO TAKE INITIATIVE.
Team members feel free to ask questions when necessary. They also understand the importance of bringing ideas and concerns to the attention of the team.

EACH TEAM MEMBER IS WILLING TO COMMUNICATE.
One does not have to be a dynamic orator to be an effective team member; each member simply needs to be willing to exchange feelings, thoughts, and ideas with others. Team members are willing to listen to one another and respect each other's thoughts and ideas.

EACH TEAM MEMBER VIEWS DISAGREEMENT AS POSITIVE.
Each member feels comfortable sharing opinions with others on the team. When a conflicting opinion is voiced, team members carefully acknowledge and analyze it so the best action may be taken. They understand the value of constructive disagreement.

EACH TEAM MEMBER VIEWS TEAM PERFORMANCE EVALUATION AS CONSTRUCTIVE FEEDBACK.
They appreciate feedback from outside sources because they realize that it may benefit their efforts in the future.

Taylor B. is a production manager for a seed company in southern Illinois.

"I work for a company that contracts to area farmers 4500 acres for growing crops. The farmer's only concern is planting and harvesting the grain. We make all other decisions; the farmers do what we ask them and when we ask them. Before the farmers can plant, though, there is a lot of background work that my team and I do.

Four specialists work under my direction. It might help if I explain each one's responsibilities:

The person in charge of allocation determines the amounts of seed to be distributed to each grower.

The agrobiologist determines the type of seed to be grown in each of the plots.

The person in charge of isolation must plan so that each plot does not receive outside pollination.

The person in charge of pesticides determines which pesticides to utilize and when to apply them.

All of these specialists depend on close teamwork to accomplish our tasks. If the person in charge of allocation overestimates the seed amounts, waste occurs; and if she underestimates, the farmers will have to wait for more seed to arrive, thus throwing off the harvesting date. The agrobiologist orders the amount of a specific type of seed, depending on what the person in charge of allocation tells him. The person in charge of isolation plans the plots according to the kind of crops being grown in neighboring plots, and the person in charge of pesticide orders the chemicals.

It's easy to see that each specialist depends on the other's expertise so that everyone can perform their own jobs efficiently."

----

10. WHAT BEHAVIORS OF TEAM MEMBERS ARE UNPRODUCTIVE?

Each team member must understand that the team's task is more important than are individual needs of the team members. If individual needs interfere with the activity of the team, these are usually exhibited in one of the following undesirable behaviors:

AGGRESSION A team member may deflate others' status by attacking the individual, the group, or the group's values. Joking in a barbed or cynical way is also aggressive behavior.

BLOCKING Disagreeing and opposing other's viewpoints beyond "reason" for personal reasons will inhibit team efforts.

DOMINATING A team member may assert authority or superiority to manipulate the team. A team member may also interrupt the contributions of others in an effort to dominate the team.

OUT OF FIELD BEHAVIOR This is indicated by a team member's lack of involvement in the team interactions. The team member may abandon the group while remaining physically with the group after a proposed idea of the member is rejected. This team member is not able to handle conflict in a constructive manner and exhibits this in defensive behavior.

SPECIAL INTEREST SOLICITATION This type of behavior is evident when a team member uses the group for advocating outside interests. Team members should be careful not to let personal interests interfere with team action.

11. HOW ARE DECISIONS MADE WITHIN TEAMS?

Decisions made within groups or teams can be difficult at best. Seldom will everyone in the group agree as to what should or should not be done. But that's the nature of the democratic process functioning in the team. As a team member, you will need to understand ALL the ways that decisions are made. By doing so, you will be able to do your part in ensuring that the team achieves its goals. Group decisions are made in the following ways:

CONSENSUS DECISION The best decision is a consensus where all members agree on the decision that is the wisest (most operable) given the circumstances. This is made after everyone has explored all aspects of the problem, examined potential solutions, and communicated (both expressing and listening) all views and opinions. A consensus decision causes extensive involvement and produces strong commitment by every team member.

MAJORITY DECISION A majority decision is determined by majority i.e., more members prefer the choice than oppose it. Our political elections use majority rule. But with teams, majority rule can solidify opposing sides. The losing side has little commitment to carrying out the decision.

"INDECISION" DECISION Someone once said that, "Not to decide is to decide." This was never more true than when referring to group decisions. Often groups will drift from one task or topic to another without resolving or "coming to closure" on anything. Lack of interest may be a strong contributor. Confusion and then frustration result causing a "motionless" team. Sometimes a team member will want this to occur so that he or she can implement a preferred decision. Team tasks must be addressed systematically, one logical step at a time.

"HAND-CLASP" DECISION Sometimes two or more members "clasp hands" for a desired decision. By doing so, they can manipulate the other members into their preference. Often the "hand clasping" is agreed to outside the group prior to a meeting. Resultant team commitment is low, and will become even lower if the procedure is repeated again and again.

CONFORMANCE DECISION. A conformance decision is caused by a pressure to conform or comply with others' wishes. Peer pressure is a major cause. This type of decision may appear to be a consensus or total agreement, but in fact, the decision is based on pressure, not on an open and honest discussion of supportive and opposing opinions. "Reality" has not been checked. When implementation time arrives, those team members who were not involved will be missing.

12. WHY IS CONSENSUS BUILDING SOMETIMES DIFFICULT IN TEAMS?

Sometimes, consensus building, i.e., total involvement and commitment by all team members, is difficult because of certain liabilities. As a team member, it is your responsibility to understand these liabilities, avoid using them, and insist that others avoid them also. These liabilities include the following:

IGNORING DIFFERENCES In order to solve a problem or achieve a task most effectively and efficiently, teams can form as a "cluster of divergents." These divergents are people who would have differing perspectives and viewpoints about the particular problem or task. Because they differ, differences will occur. Consensus building is the process of sharing all perspectives and viewpoints, generating alternative solutions, weighing proposed solutions, and converging on the wisest choice. To avoid differences for the sake of initial consensus is unfortunate. Foster differences and use them creatively within a team.

DISCUSSING SOLUTIONS PREMATURELY It is easy to jump to a solution, especially if some members think they have THE solution. Often, however, members suggest solutions to different problems. The problem must first be fully defined and understood by everyone. Someone once said that a problem well defined is half solved. This is especially true of team consensus building. This liability causes confusion, conflict, and loss of time.

HIDDEN or PERSONAL AGENDAS Often team members will bring hidden or personal agendas to meetings. These include the need to win support of one's position, need for acceptance or recognition, ego and pride. These interfere and disrupt the team's efforts.

PRESSURE TO ACCEPT DECISION A team member may feel pressure to accept a majority view in order to preserve team harmony and to be seen as a "good Scout." The cost is a wrong or lower quality decision. To function effectively, a team needs a "reality tester." The trick is to discriminate between reality testing and personal agendas.

LACK OF QUESTIONING Enthusiasm over apparently unanimous acceptance of a proposed idea or solution may overshadow reality-testing questions which would improve the quality and accuracy of the decision.

MEMBER DOMINANCE Sometimes one or two individuals will dominate the team because of their status, verbal skills, persistence, insensitivity, or experience even when that experience is inappropriate for the task. This situation will lead to an imbalance of influence by single members. If someone tends to dominate the team, you need to perform a "gatekeeping" function.

13. WHAT FACTORS LIMIT EFFECTIVE TEAMWORK EFFORTS?

Based on what you learned from the previous key question, take a few minutes and answer the following questions. Circle AGREE or DISAGREE.[1]

1. Positive feelings between team members are important to successful team progress.
   AGREE DISAGREE

2. It is necessary for a team to evaluate and critique its work on a regular basis.
   AGREE DISAGREE

3. It is important for team members to agree on their objectives and goals before their efforts begin.
   AGREE DISAGREE

4. Team members should not take disagreements personally. Constructive conflict is conducive to team progress.
   AGREE DISAGREE

5. It is important to obtain opinions from each of the team members.
   AGREE DISAGREE

6. Group members should share their feelings openly during a team effort to help make the team successful.
   AGREE DISAGREE

7. Orderly procedures are necessary for a successful team.
   AGREE DISAGREE

8. Members should tolerate conflict between the team members.
   AGREE DISAGREE

9. Each team member should support and encourage one another's contributions during team effort.
   AGREE DISAGREE

If you agreed with all of the previous statements, you have a good idea of what factors can limit effective teamwork efforts.

14. WHAT TERMS ARE COMMONLY ASSOCIATED WITH TEAMWORK?

Accountable - to be held responsible for one's actions.

Collegial team - a group with no apparent hierarchy of roles.

Constructive conflict - friction between two or more people which promotes improvement or development.

Educated risk taking - taking a chance on an idea which is based on some knowledge of fact.

Facilitated team - a group which consists of group members and a facilitator.

Facilitator - a team member who is responsible for keeping the team's efforts directed towards the team's stated goal.

Individual functions - those personal needs which every team member brings to the team.

Leader - that person who ranks first in the team hierarchy. This designated person has the responsibility for keeping the team from straying from its original goals and objectives.

Maintenance functions - those roles which promote other member's feelings of personal worth and encourage them to participate in the team's activities.

Problem-solving team - a group of two or more people whose main objective is creating new products, ideas, or solutions.

Production team - a group of two or more people whose main objective is unit output.

Pyramidal team - a group with a definite hierarchy of roles.

Task functions - roles which stimulate group enthusiasm and enable the attainment of the team's task.

Team - a group of two or more people with a common goal or objective.

Teamwork - the process of two or more people joining forces in pursuit of a common goal or objective.

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3. Tuckman, B.W., & Jensen, M.A. (1977). Stages of small group development revisited. Group & Organization Studies, 2(4), 419-427.

The following resources are recommended:

Dyer, William G. (1977.) Team Building: Issues and Alternatives. Reading: Addison-Wesley Publishing Company.

Slavin, Robert E. (1980). *Using Student Team Learning*. Baltimore: The Johns Hopkins University.

"Teamwork", video with Jack Whitaker, United Training Media, P.O. Box 718, 6633 West Howard Street, Niles, IL 60648-9990, (800) 558-9015, in IL (312) 647-0600.

"Working Together Works", video, Dartnell, 4660 Ravenswood Avenue, Chicago, IL 60640-9981.

Team-Work & Team-Roles Inventory, Organization Design and Development, 101 Bryn Mawr Ave., Suite 310, Bryn Mawr, PA 19010.

"The Superteam Solution: Successful Teamworking in Organizations", paperbound book, University Associates, Inc., 8517 Production Avenue, San Diego, CA 92121, (619) 578-5900.

APPENDIX B
TEACHER'S ADDENDUM TO INSTRUCTIONAL MODULE ON TECHNICAL TEAMWORK

DRAFT - For Field Testing Purposes Only

Project GENTEC
Generic Technical Competency

INSTRUCTOR'S ADDENDUM to Instructional Module on TECHNICAL TEAMWORK

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Developed in part with funding from the
Illinois State Board of Education's
Department of Adult, Vocational and Technical Education
Springfield, Illinois

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INTRODUCTION

The purpose of this INSTRUCTOR'S ADDENDUM to the GENTEC instructional module on TECHNICAL TEAMWORK is to provide you, the instructor, with:

1. an overview, definition, rationale, and example of the generic technical competency being taught,
2. additional instructional activities which can be used in a classroom setting, and
3. additional instructional resources in order to enhance your instructional efforts.

The instructional module is intended to be self-contained. The average student should be able to complete the module and learn the competency without outside assistance. The competencies are presented in a logical, understandable, and concise form. Classroom instruction should involve:

*lecturettes,
*open discussion,
*identification of competencies and application to employment situations,
*additional instructional activities,
*and opportunities to ask questions.

However, to improve the acquisition and retention of the information, your first step is to read and become familiar with the entire student-based instructional module. This INSTRUCTOR'S ADDENDUM is only a supplement to the module.

Second, review the intended learner outcomes of the module. This will help you focus your teaching on the most pertinent aspects of the competency.

Third, enhance your understanding of the competency by reviewing several of the suggested resources/references. Copies of several significant resources have been appended to this addendum for your convenience.

Fourth, prepare a lesson plan on the competency. This should begin by helping students to generate a list of their key questions regarding the competency. You should find that a student-generated list of key questions will match the key questions used in the instructional module.

Fifth, assign the students to read and complete the instructional module.

Sixth, present the lesson. Masters for overhead transparencies have been appended. With some modules, audio and/or video tapes have been prepared to assist with your teaching. These are listed in the RESOURCES/REFERENCES section.

Finally, assess how well the students have mastered the GENTEC competency. This may be accomplished by administering the post-test, which is included in this module.

OVERVIEW OF GENTEC

In today's market of competitive hiring, the prospective employee with the best preparation will get and keep the job. But the best technical preparation is not always measured by occupational proficiency. Certain generic technical competencies are becoming increasingly important. Most vocational educators and occupational trainers will agree that program completers with knowledge, skills and attitudes in generic technical competencies are better prepared to enter and progress within a desired occupation.

GENTEC is a broad-based "capstone" curriculum of generic technical competencies involving critical thinking, sophisticated behaviors, and professional attitudes. GENTEC is applicable to all occupational clusters of agricultural, business, health, home economics, and industrially-related occupations.

The purpose of GENTEC is to increase students' competence in areas of generic technical knowledge, skills, and positive attitudes in order to enhance their competitive edge for job entry and advancement.

Many educators, realizing the importance of generic technical competencies, have attempted to provide instruction by integrating time on each topic into an existing curriculum. The problem has been that an encompassing curriculum of generic technical knowledge, skills, and attitudes did not exist. In addition, succinct instructional materials on specific topics of generic technology did not exist in a readily available form for use in skill-level courses on the high school and community college levels (grades 11-14).

GENTEC may be used as a separate curriculum for a specific course or courses. Students in almost any technical major benefit from a course on critical thinking skills on a technical level.

Also, GENTEC may be incorporated into a larger skill-development curriculum at a logical point. The instructor may spend as much time or as little time as desired.

READABILITY

The Fog Index of Readability was taken at three random points within the module. The range was determined to be at the tenth-grade level.

GENTEC COMPETENCY: Technical Teamworking

DEFINITION:

Technical Teamworking is working together in an efficient and effective manner toward a shared goal. It is the sharing of talent through cooperative action.

EXAMPLE:

Wayne Gretzky isn't the fastest, strongest, or most powerful hockey player today, but he is one of the greatest. His greatness comes not only from his hockey skills but also from his ability to work together with his team members to win the game. He blends in effectively with his teammates by constantly working together with them. (Berger, 1985)

RATIONALE:

Research has uncovered a distinct difference between Japanese and American behavior. The Japanese are much more "group oriented" than Americans. This means that Japanese technicians take their rewards from group achievement rather than from individual achievement. To the Japanese, success is measured by how well a technician is a team player. (Christopher, 1986)

Teamworking is an essential element of worker productivity. To accomplish goals within an organization, workers must be able to work productively with each other. Today, employers are focusing on teamworking to help achieve their goals.

Teamworking will improve your personal communication skills. In working with a group, you'll learn to communicate more effectively. Because teamworking encourages technicians to break with convention and try new ways to get the job done, personal creativity may also be improved.

INTENDED LEARNER OUTCOMES:

A learner who has mastered this competency will be able to:

1. Describe the concept of teamwork and understand its value.

2. Describe the benefits of successful team effort.

3. Explain the difference between a production team and a problem-solving team.

4. Explain the characteristics of a successful team.

5. Explain the factors that can limit effective teamwork efforts.

6. Explain how teams may be organized internally.

7. Explain the effective behaviors of each member during teamwork.

8. Explain the functions of each member during teamwork.

9. Explain the individual functions of each team member within a team.

10. Describe the unproductive behaviors of team members during a team effort.

11. Describe and explain the normal stages of team development.

12. Explain how decisions are made within teams.

13. Explain why consensus building is sometimes difficult in teams.

14. Define the terms commonly associated with teamwork.

RESOURCES/REFERENCES (Listed in order from best to least best):

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Slavin, Robert E. (1980). Using Student Team Learning. Baltimore: The Johns Hopkins University.

Joint venture devoted to Japanese way. (1987, January). Chicago Tribune, p. 1, 9 (Section 7).

"Teamwork", video with Jack Whitaker, United Training Media, P.O. Box 718, 6633 West Howard Street, Niles, IL 60648-9990, (800) 558-9015, in IL (312) 647-0600.

"Working Together Works", video, Dartnell, 4660 Ravenswood Avenue, Chicago, IL 60640-9981.

"Winning Through Teamwork", cassettes, Nightingale-Conant Corporation, 7300 North Lehigh Avenue, Chicago, IL 60648-9951, (800) 323-5552, in IL (800) 972-5855.

"Effective Management Communication", cassettes and workbook, Management Research Systems Publications, 2320 S. Third St., Ste. #7, Jacksonville Beach, FL 32250, Stop A, (904) 241-1721/241-1722.

TTeam-Work & Team-Roles Inventory, Organization Design and Development, 101 Bryn Mawr Ave., Suite 310, Bryn Mawr, PA 19010.

Wean, Raymond John. (1969). Teamwork and Technology; The Story of Wean United. New York: Newcomen Society in North America.

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Hall, James; Leidecker, Joel; and Posner, Barry. (1984, July). Will Your Workers Sing the Company Song? Training and Development Journal, pp. 68-70.

Newman, Betsy. (1984, February). Expediency as Benefactor: How Team Building Saves Time and Gets the Job Done. Training and Development Journal, pp. 26-30.

"One Small Step", video, Cally Curtis Co., 1111 N. Las Palmas Avenue, Hollywood, California 90038-9981, (213) 467-1101.

"Team Building: A Blueprint for Success", video, American Management Association, Order Department, 85 Main Street, Watertown, MA 02172--9990, (800) 225-3215, in MA (617) 926-4600, $595.00.

"Making Meetings Work: A five-step plan", film or video, Britannica Films--Encyclopedia Britannica Educational Corporation Business and Industry Division, 780 South Lapeer Road, Lake Orion, MI 48035, (800) 554-6970, in Michigan (313) 693-4232.

he Game of Transactional Analysis," Training House, Inc., P.O. Box 3090, Princeton, NJ 08543-3090, (609) 452-1505.

"We're on the Same Team, Remember?", film, Roundtable Film & Video, 113 North San Vicente Boulevard, Beverly Hills, CA 90211-9965.

Teamwork Effectiveness/Attitude Measurement, A Peer Assessment Tool for Building and Reinforcing Teamwork. Education Research, 370 Lexington Avenue, 27th Floor, New York, NY 10017.

"Work Smarter as a Team", cassette tape, Alec Mackenzie and Associates, Inc., Mackenzie Building, 88 Salem Street, Greenwich, NY 12834-0130 (518) 692-9626.

"Tango Teambuilding", film/video, Monad, 163-60 22 Avenue, Whitestone, NY 11357 (718) 352-2314.

"Working Together--Works", United Training Media, 6633 W. Howard St., Niles, IL 60648.

SUGGESTED INSTRUCTIONAL ACTIVITIES

1. Invite a member of a production team to be a guest speaker. The guest speaker can relate personal teamworking experiences.
   *The instructor should prepare questions that the students may ask the guest speaker.

2. Take a field trip to a local business and view a production team in action.

3. Ask class members to share positive or negative experiences they have had in working on teams. (Senior prom planning committee, homecoming float committees, summer or part-time job experiences.)

4. Have class members comment on the effectiveness or ineffectiveness of teamworking efforts that they have observed. (McDonald's counter staffs, cafeteria workers serving food, airline flight crews.)

extracted from these items. Participants then volunteer key "learnings" from the experience, and these are discussed. (Ten minutes.)

XVI. Members meet within their groups again to suggest and discuss ways in which the things that have been learned during the activity can be used to improve the functioning of other task groups with which they are involved. (Ten minutes.)

Variations

I. Each group can be instructed to select its own song.
II. Singing can be required during the second round of passing.
III. More planning and task rounds can be conducted.

Similar Structured Experiences: *Vol. II:* Structured Experience 31; *Vol. VIII:* 302; *'82 Annual:* 319.

Submitted by R. Moses Thompson.

BLOCK BUSTER GAME SHEET

1. Each group member will be given a block to pass.
2. All objects will be passed in a clockwise direction to the person on the left. Passing of objects must be done in rhythm with the music.
3. The object of the game is to bring the object in the center of the table into circulation and to earn points by completing passing cycles. The group scores one point each time the center object goes all the way around the circle without error. The referee will tally this score.

However

4. Each member can have only one object in front of him or her at one time.
5. The center object must be brought into the cycle in *rhythm* with the passing of the blocks. It can be brought into circulation only when objects are in the process of being passed.
6. Violations will be tallied and deducted from the points earned for completing a cycle of passing the center object around the circle. Any action not in accordance with the rules will be considered a violation.
7. The activity will be divided into four rounds:
   Round 1, planning period: ten minutes.
   Round 2, task period: five minutes.
   Round 3, planning period: five minutes.
   Round 4, task period: ten minutes.
8. Talking is not allowed during the passing rounds unless it is specifically authorized. Violations will be tallied and deducted from points earned for completing a passing cycle.
9. Each group has a referee who will not participate actively in the planning and passing phases but who will compute scores and penalize the group for any violations. The referee's decisions are final.
10. Reorganization: A group can elect to stop and reorganize itself at any time during a round; however, the other groups can continue to accumulate scores during this time.

BLOCK BUSTER REFEREE SHEET

You are not to participate directly in the group's planning and passing activities but are to act as a process observer. In addition, your task is to enforce the rules of the game. You declare when the group's object has made a complete cycle and you record the score on the group's tally sheet. Also record all violations of the rules and announce what the violation is when it occurs.

- No talking is allowed during the passing rounds unless it is specifically authorized.
- You will be asked to discuss your observations of the group's process during a debriefing period following the four rounds.

SELF TEST ON TECHNICAL TEAMWORKING

TRUE/FALSE After reading each statement carefully, circle T or F, depending on whether you feel the statement is True or False.

T F 1. The goal of a production team is to create new products, ideas, or solutions.

T F 2. Conflict of any kind should not be tolerated by team members.

T F 3. Team members should support and encourage one another's contributions rather than ridicule them.

T F 4. The main difference between a pyramidal team and a collegial team is that a collegial team has a leader present and is obviously labeled.

T F 5. The role of the facilitator in a facilitated team is to encourage discussion between team members and keep the discussion pointed towards the goal.

MATCHING Match the unproductive behavior in column A with its explanation in column B.

A	B
6.______Aggression	A. Asserting authority or superiority to manipulate the contributions of others in an effort to control the team.
7.______Out of Field Behavior	B. Using the group for advocating one's outside interests.
8.______Blocking	C. A "playboy-like" display of one's lack of involvement in the team's interactions.
9.______Dominating	D. Disagreeing and opposing beyond "reason.:
10._____Special Interest Solicitation	E. Deflating others' status by attacking the group or its values.

MULTIPLE CHOICE Circle the letter which best finishes the statement:

11. In the HARMONIZING function, team members are concerned with:
    A. keeping communication channels open.
    B. checking to see if the team is nearing a decision.
    C. attempting to reconcile disagreements.
    D. being friendly, warm, and responsive to others.
    E. offering an alternative to a rejected idea.

12. In the GATE KEEPING function, team members are concerned with:
    A. reducing tension and encouraging team members to explore differences.
    B. keeping communication channels open.
    C. sending up a "trial balloon" to test a possible conclusion.
    D. indicating by facial expression or remark the acceptance of others contributions.
    E. All of the above.

13. Consensus building is sometimes difficult in teams because:
    A. team members sometimes bring hidden or personal agendas to the meetings.
    B. a team member may feel pressure to accept a majority view in order to preserve team harmony.
    C. sometimes one or two members will dominate because of their status or verbal skills.
    D. All of the above.
    E. None of the above.

SHORT ANSWER

14-17. List four attitudes common to effective team members:

1.

2.

3.

4.

18-22. Briefly describe each of the behaviors of effective team members:

1. Initiating

2. Informing

3. Clarifying

4. Summarizing

5. Reality testing

23-27. State the five stages of team development (in order of their natural occurrence) and briefly describe each.

1.

2.

3.

4.

5.

28-30. Name four types of decisions which are made within teams:

1.

2.

3.

4.

ANSWER KEY TO SELF TEST ON TECHNICAL TEAMWORKING

True/False
1.F
2.F
3.T
4.F
5.T

Matching
6.E
7.C
8.D
9.A
10.B

Multiple Choice
11.C
12.B
13.D

Short Answer
14-17. The student should answer with any FOUR of the following statements:
Each team member:
*is committed to the teamwork philosophy.
*understands the goals of the team.
*understands his or her own individual roles and responsibilities as well as other team members'.
*is willing to take initiative.
*is willing to communicate.
*views disagreement as positive.
*shares in the decision making.
*views team performance evaluation as constructive feedback.

18-22.
Initiating: Proposing tasks, goals, or objectives to be completed by the team.
Informing: Offering input to the team concerning facts of the situation.
Clarifying: Interpreting ideas or suggestions of other team members and defining issues.
Summarizing: Pulling together related ideas to coordinate the team objective.
Reality testing: Making a critical evaluation of a suggested idea.
NOTE: These are defined more explicitly in Key Question #8.

23-27.
Forming: Team members become acquainted with each other. Goals and objectives are set at this time.
Storming: Conflict emerges naturally at this time.
Norming: Cooperation is the main theme in this stage.
Performing: Team members are able to work together cooperatively during this stage.
Adjourning: The major tasks, original goals, and objectives have been attained. The team may make an evaluation of their efforts at this time.

28-30.
The student should answer with any of the THREE of the following:
*consensus decision
*majority decision
*"indecision" decision
*"hand-clasp" decision
*conformance decision

APPENDIX 1

WHAT FACTORS LIMIT EFFECTIVE TEAMWORK EFFORTS?

Circle AGREE or DISAGREE, depending on your feelings to each statement.[1]

1. Positive feelings between team members are important to successful team progress.

AGREE DISAGREE

2. It is necessary for a team to evaluate and critique its work on a regular basis.

AGREE DISAGREE

3. It is important for team members to agree on their objectives and goals before their efforts begin.

AGREE DISAGREE

4. Team members should not take disagreements personally. Constructive conflict is conducive to team progress.

AGREE DISAGREE

5. Team members should not allow personal issues and needs to influence the teamwork process.

AGREE DISAGREE

6. It is important to obtain opinions from each of the team members.

AGREE DISAGREE

7. Group members should share their feelings openly during team efforts in order to make the team successful.

AGREE DISAGREE

8. Orderly procedures are necessary for a successful team.

AGREE DISAGREE

9. Members should tolerate conflict among team members.

AGREE DISAGREE

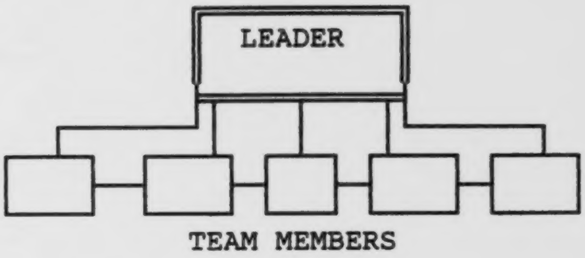
10. Each team member should support and encourage each other's contributions during team effort.

AGREE DISAGREE

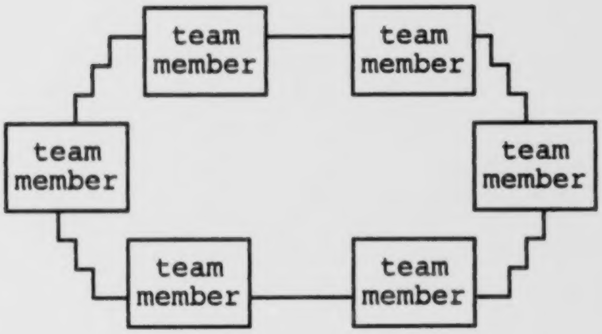
Appendix 2

HOW MAY TEAMS BE ORGANIZED INTERNALLY?

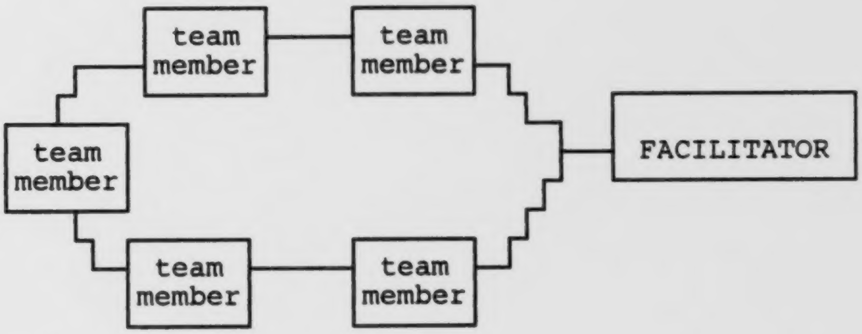
PYRAMIDAL TEAM


LEADER
TEAM MEMBERS

COLLEGIAL TEAM


team member
team member
team member
team member
team member
team member

FACILITATED TEAM


team member
team member
team member
FACILITATOR
team member
team member

Joint venture devoted to Japanese way

By Matt O'Connor
Chicago Tribune
Sunday, January 11, 1987

NORMAL, Ill.-Diamond-Star Motors Corp., the joint-venture automaker, wants to duplicate a Japanese plant in the cornfields of central Illinois.

Toward that end, the company's first 26 factory workers--highly-skilled maintenance men who will keep the plant's more than 400 robots running--will journey soon to Japan for no less than 10 months of training.

Although Diamond-Star will be the world's most automated car plant when completed, with production to begin late next year, the joint venture's success will lie in teaching its American work force to meet Japanese standards.

Diamond-Star is indeed a 50-50 venture between Chrysler Corp. and Japan's Mitsubishi Motor Corp. But--make no mistake about it--this will be a Japanese-style plant run by Japanese managers.

Its American work force will be expected to be as productive as autoworkers in Japan by adhering to Japanese concepts of teamwork and constant self-improvement ("kaizen" in Japanese).

"We failed," G. Glenn Gardner, an ex-Chrysler executive who's Diamond-Star's chairman, said of the American auto industry. The Japanese "are eating our lunch on a regular basis. The way they do it is through productivity."

In time, another 275 of Diamond-Star's ultimate work force of 2,900 will follow the first group to Japan for training stretches of up to six weeks at two Mitsubishi plants near Nagoya, about 250 miles west of Tokyo.

Gardner expects the tab for training to perhaps reach $50 million, or $10 million more than the state earmarked for that purpose in the incentive package that wooed the plant to Illinois.

Diamond-Star, of course, will enjoy a distinct advantage in being able to hire an all-new work force.

To help determine just what makes the Japanese so productive, consultants hired by the joint venture videotaped for a month what happened on the assembly line at one key Mitsubishi plant. From that and interviews with management and first-line supervisors, the consultants pinpointed the traits it takes to succeed in a Japanese factory. They then devised simulation work exercises to help Diamond-Star hire the right people.

Applicants for the skilled maintenance posts, for instance, had to rebuild a robot with three or four other strangers in a test of their teamwork and leadership skills--not their technical ability, as some might have thought.

Attitude, even more than aptitude, will be the single most important factor in who's hired, Gardner said. Workers will have to possess certain technical skills, but those who show flexibility, an eagerness to learn and an ability to work in a team will gain employment.

Those qualities will be critical, because Diamond-Star wants to promote quality and productivity by creating a pleasant workplace, free of America's traditional adversarial relationship between management and employee. The Japanese put a premium on harmony ("hito no wa") on the factory floor.

Appendix 4

INTERVIEW BETWEEN
MARY JO EBERSPACHER, TEAMWORK CONSULTANT TO GENERAL ELECTRIC
AND
ROBIN E. BEDWELL, PROJECT ASSOCIATE, GENTEC

AUGUST 3, 1987

BEDWELL: Thank you for allowing me to interview you for the GENTEC module, "Technical Teamworking."

EBERSPACHER: You're welcome. I'm happy to help.

BEDWELL: What are some of the reactions of the employees at G.E. when they are told they are going to work as a team member?

EBERSPACHER: There are a broad range of reactions for various reasons. Some employees are simply hesitant to change. Many feel a little threatened in that they might feel more peer pressure because of working on a team. For the most part, though, the employees express a positive interest along with a little hesitancy towards the "unknown."

BEDWELL: What is the management's attitude at G.E. towards teamworking? Are they trying to force the concept of teamwork onto the employees?

EBERSPACHER: I don't think so. I think teamwork is management's idea of maximizing profit and at the same time maintaining quality and quantity with less overhead. Their intent is to encourage the worker to be more responsible for his own individual work.

BEDWELL: Do you see the teams progress through any natural "stages"?

EBERSPACHER: Yes, I had been told that there are four stages of team development: forming, storming, norming and performing. It sounds like something that works only in textbooks, but it is amazingly true for the teams that with whom I work.

BEDWELL: I'd like to know a little about the demographics of a "typical" team at G.E. Do characteristics such as age, sex, education affect a team's performance?

EBERSPACHER: The makeup of the teams vary. In some areas, the group members are required to have specific skills to be on that team, while in others skills aren't that important. The ages vary within all of the teams.

BEDWELL: How are the teams organized internally?

EBERSPACHER: In terms of a specific leader, there are none. G.E. does have a facilitator who is in charge of facilitating within every team. He drops in on each team's meeting at random for as long as the team needs him.

BEDWELL: What do you think is the optimum number of members for a team?

EBERSPACHER: Realistically, the best team has between six and eight members. That varies, though, depending on how large the product line is that they are working on.

BEDWELL: What does G.E. see as the difference between their quality circles and teamwork efforts?

EBERSPACHER: Our quality circles attend to creature comforts: smoking policies, moving a water cooler, things like that. Teamwork is seen as a group working together cooperatively to produce.

BEDWELL: What do you see as being characteristic of a successful team?

EBERSPACHER: A successful team has very clear and agreed upon goals. They think things through, they discuss and they keep very clear records and notes. Also, successful teams have very clear ideas of the roles, responsibilities and goals of each of the members. They meet, have an agenda and follow it, the members come prepared and are ready to get the job done. They are also willing to facilitate and ask questions when necessary.

BEDWELL: Do you notice any problems between "individualism" and group effort?

EBERSPACHER: The members realize that one doesn't have to sacrifice himself for the group, but each understands that there has to be concessions at some point.

BEDWELL: What do you feel are the benefits of working on a team?

EBERSPACHER: Job security, team members will experience self-satisfaction from doing a job well and they will also feel good about participating in an innovative concept.

BEDWELL: What three things would you want a person to know before becoming involved with teamworking?

EBERSPACHER: One, that person should be willing to communicate. He doesn't necessarily have to be a good communicator, he just needs to be willing to share his feelings, concerns and issues. Two, he needs to feel a sense of responsibility to himself and the company. Three, he needs to feel a sense of satisfaction from a "job well done." And if I may add a fourth, he must be willing to work with other people.

APPENDIX C
INSTRUCTIONAL MODULE ON TECHNICAL PROBLEM SOLVING

DRAFT - For Field Testing Purposes Only

Project GENTEC
Generic Technical Competency

Learner-Based Instructional Module

on

TECHNICAL PROBLEM SOLVING

Prepared by:
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Developed in part with funding from the
Illinois State Board of Education's
Department of Adult, Vocational and Technical Education
Springfield, Illinois

1988
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Dan A. is a campaign manager for a candidate for Congress in a rural area.

"Image building for candidates for political office isn't easy. I've been doing this for five years now and find that I have to deal with problems every single day.

My latest problem is trying to get Mary B., a woman from a small urban community elected to Congress. There are many possible solutions to this problem; I'm getting paid to find the right one.

The campaign is many-faceted. There's the issue of media exposure; what my client says to whom, when, where and how. Speaking engagements are part of this, too. Being at the right luncheon or rotary club meeting can often clinch it for a candidate.

What about monetary support for my client? Getting my client elected is less of a problem with more money. Locating that money is the problem. Fundraisers can be critical. Soliciting the wrong group for support can be fatal to a candidate's campaign. And how should I spend that money once it's found? Publicity? Printing brochures?

Without a reliable problem solving method, I'd be sunk. All problem situations are different, but you can see with the kinds of problems I encounter, it is important to try to generate as many possible solutions as I can. I have to also carefully analyze each possible solution for flaws. It's easy to overlook certain elements of the solution if I don't take my time. But I can't take too much time. I have had to learn to carefully manage my time. Election day is my deadline."

The purpose of this GENTEC module is to help you examine the critical aspects of problem solving. Most people don't realize how often they encounter and solve problems every day of their life. It is common for some to agonize over solving problems. This module will help to explain and simplify the problem solving process.

When you complete this instructional module, you will be able to:

*Define the concept of technical problem solving.

*Explain the basic skills technicians need in order to effectively solve problems.

*List and explain the sequential steps of technical problem solving.

*Justify the importance of following sequential steps in problem solving.

*Enact the various techniques that are needed for technical problem solving.

*Apply the concepts of technical problem solving to a hypothetical situation, generate three or more solutions and evaluate each.

*Apply other strategies for solving problems.

*Define the terms commonly used in technical problem solving.

The following module is designed to provide you with answers to the following key questions:

1. What is technical problem solving?
2. Why is it necessary to understand the process of problem solving?
3. What basic skills do I need to effectively problem solve?
4. What are the steps in problem solving and how do they apply to a problem situation?
5. How do technical problem solving skills apply to occupational situations?
6. What are some alternative strategies for solving problems?
7. What are the terms commonly used in technical problem solving?

1. WHAT IS TECHNICAL PROBLEM SOLVING?

Most of us experience problems many times in our occupational settings. What combination of fertilizer, fungicides and pesticides will maximize my fruit production? Should I purchase a new milling machine or have the old one overhauled? What would be the most efficient way to store medications which are given frequently? The problems may differ from occupation to occupation, but the process of solving them is the same. The intent of this module is to teach you that process. After becoming comfortable using an efficient problem solving method, you will be able to systematically solve a problem situation.

What is a problem?

Before we can learn about the process of technical problem solving, we should first understand what constitutes a problem. A problem may be defined as a discrepancy between current conditions and desired conditions. In other words, present conditions are unsatisfactory and you see the need and have the desire to change them.

Joel L. is a self-employed stone mason. He describes a problem situation that he encountered on a particular job.

"I remember the first time I was called in to re-vamp a 75 year old fireplace. It was so old that the damper hinges were corroded, and it wouldn't even open or close correctly. Among other things, I had to fix the fireplace just right so it projected heat properly. If you don't do it correctly, the fireplace will smoke up your client's home and that's not good. I had to be careful with the structure of the fireplace, too, because of its age.

I'm in charge of a lot of custom jobs so it's usually different every time. I used to have to sit down and carefully outline my problem solving method whenever I encountered a problem situation. After doing that so many times, it gets to be routine. Now I can pretty much do it in my head. But first I had to learn the steps and experience it many times to become familiar the process."

INSTRUCTIONAL ACTIVITY #1:

How did Joel define the problem? Was it a discrepancy between current conditions and desired conditions? What is the discrepancy in the example of the stone mason?

The first one is that the damper hinges were corroded. The second is that it was not projecting heat properly. The stone mason recognized the discrepancies and knew how to go about correcting them. That's technical problem solving.

2. WHY IS IT NECESSARY TO UNDERSTAND THE PROCESS OF PROBLEM SOLVING?

If the solution to a problem is clear, the answer is simple. But often the solution to a problem is not clear. That's when you'll need a systematic process of problem solving.

There are other reasons why it is necessary to understand the process of problem solving. Some of those are:

EFFECTIVE TIME MANAGEMENT: Learning to systematically solve problems will help you to effectively manage your available time. If a problem solver does not spend enough time gathering facts concerning the problem situation, they will not have complete information about the situation. Spending too much time may result in the problem solver getting bogged down with details. There may not be enough time left over to test the solution completely.

EFFECTIVE GROUP PROBLEM SOLVING: Efficient problem solvers also understand that enhancing and refining their individual problem solving skills will help them to function more effectively in a group problem solving setting.

EFFECTIVE STRESS MANAGEMENT: Haphazard attempts at problem solving create feelings of stress. Those that can apply an effective problem solving method to problems will experience less feelings of stress in an occupational setting and more positive feelings about their abilities.

3. WHAT BASIC SKILLS DO I NEED IN ORDER TO EFFECTIVELY SOLVE PROBLEMS?

There are five basic skills needed in problem solving. They include:

* IDENTIFICATION - You need to know how to identify facts which directly relate to the problem situation. This includes being able to determine what facts are extra and not needed. You should also be able to determine an appropriate method.

* ORGANIZATION - You need to know how to organize relevant facts surrounding the problem situation. Important facts may be overlooked if you do not have good organizational skills, thus jeopardizing the problem solving methodology. Being able to effectively organize your time during problem solving is a must, also. If you devote too much time to problem solving, it can cause you to become bogged down with details. Likewise, if you don't devote enough time to the methodology of problem solving, the entire process may fail on that element alone.

* DOCUMENTATION - You need to know how to document facts during all steps of the problem solving process. Each step of the problem solving process depends on clear, concise documentation for future referral.

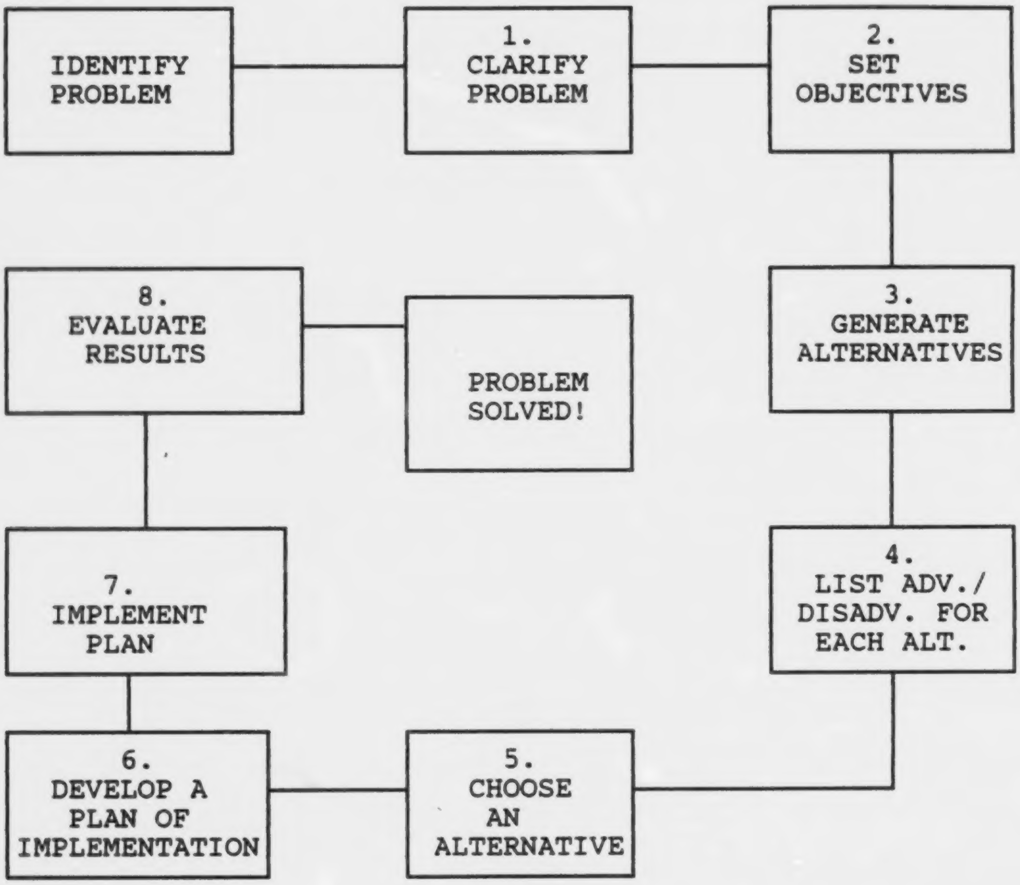
* PREDICTION - You need to know how to predict possible outcomes of generated alternatives. Competence with this skill saves time.

* EVALUATION - You need to know how to evaluate the tested solution in an unbiased manner. Evaluation should be made without any pre-conceived notions of what the "ideal" solution should be.

4. WHAT ARE THE STEPS IN PROBLEM SOLVING AND HOW DO THEY APPLY TO A PROBLEM SITUATION?

There are sequential steps you should follow when attempting to solve a problem. Follow through the eight steps outlined below and then read the explanation on the following page which details each.

THE PROBLEM SOLVING STEPS


IDENTIFY PROBLEM
1. CLARIFY PROBLEM
2. SET OBJECTIVES
3. GENERATE ALTERNATIVES
4. LIST ADV./ DISADV. FOR EACH ALT.
5. CHOOSE AN ALTERNATIVE
6. DEVELOP A PLAN OF IMPLEMENTATION
7. IMPLEMENT PLAN
8. EVALUATE RESULTS
PROBLEM SOLVED!

1. CLARIFY THE PROBLEM - You must clearly understand how the problem is keeping you from obtaining your goals. The more specific you can be in defining the goal, the closer you will be to determining the solution. Most of your work is done once you have clearly defined the problem. You may find it helpful to determine what the problem is not. Separate what is happening from what is not happening. Also, clarify when and where the problem occurs and does not occur.

Determine the most critical aspects of the problem. The goal is what your problem isn't, so change your problem into your goal. Read the following example carefully:

It is a hot summer day and the first thing you do when you get into your car is to turn on the air conditioner. After giving the air conditioner a chance to begin emitting cool air, you notice that it is still putting out hot air. You wonder to yourself what the problem may be.

What is the problem? It's not that the air conditioner doesn't blow air out. It is blowing air out, but it's blowing hot air instead of cool air.

You may have to determine sub-goals and achieve them before you reach your main goal. Clarification of the problem is the most important step. It is also important at this time to determine how you will keep a record of your progress. Detailed records are imperative in accurate problem solving.

2. SET OBJECTIVES - Make sure you know the direction you are headed when you set your objectives for the problem situation. It is important to determine both long and short range goals and place them in a prioritized order. If only short range goals are considered, it may be necessary later to re-solve the initial problem. Ask yourself, "What is it that I am trying to accomplish right now?" and "What is it that I am trying to accomplish?" You should also list any factors which will indicate success when the problem is solved, along with any limits and desires of the end solution.

3. GENERATE ALTERNATIVE COURSES OF ACTION - Begin to plan your solution by brainstorming for alternatives. Many alternative courses of action will seem very obvious to you while others may not be so obvious. Think carefully. Don't throw any out because they seem too far out to be workable or relevant. When you have developed all of your alternative courses of action, list them in rank order from "most ideal" to "least ideal". If you have not clearly stated and defined your problem in step #1, your alternatives will not be accurate. At this time, double-check your stated problem. Use personal contacts who have been in the same type of problem situation as an outside resource for information.

4. LIST ADVANTAGES/DISADVANTAGES ASSOCIATED WITH EACH ALTERNATIVE. Compare each alternative against your stated goal(s). You may wish to talk to others who may have experienced a similar problem for their input. Anticipate as many obstacles as you can and generate alternatives accordingly. Develop alternate ways to implement the chosen alternative.

5. CHOOSE AN ALTERNATIVE. Determine which alternative you feel is most feasible and decide upon appropriate implementing actions. Detail your plan for carrying out your solution. Determine at this time how you will keep track of your progress. The validity of your chosen alternative will depend largely upon how accurate, clear and complete your work thus far in the problem solving process has been.

6. DEVELOP A PLAN OF IMPLEMENTATION. This, when completed, will be a detailed course of implementation for one of your alternatives. It is better to be too elaborate than not specific enough.

7. IMPLEMENT PLAN. Test the chosen alternative. Carry out the plan which you detailed in step #3. If your plan of implementation fails, ask yourself the following questions to help find the weakness:

* Why did the problem occur in the first place?

* Has the problem been defined accurately and concisely?

* Are my objectives realistic and within reach?

* Did I thoroughly brainstorm for alternatives?

* Are there any omissions within my generated alternatives?

* Are the generated alternatives realistic?

* Have I analyzed my plan of implementation for flaws?

* Have I carefully analyzed my evaluation for oversights and wrong assumptions?

* Did I keep accurate and detailed records of my progress for each step of the flowchart?

After answering the previous questions, the solution should become apparent. You may have to progress through the problem solving steps at the appropriate step.

8. EVALUATE RESULTS. Poke holes in your solution and try to make it into a better one. Ask yourself if this is the desired solution. Follow up and assess your approach and determine if the solution worked. If it failed, try to determine why. At this point, it may be necessary for you to list other alternatives and progress through the problem solving steps a second time.

INSTRUCTIONAL ACTIVITY #2
Progress through the problem solving steps with the following problem situation:

You need to buy a car. You've thoroughly investigated all of the cars in your price range and found that the one that best fits your needs is available at a dealership located in the town in which you live. However, you don't have enough money in your savings account to make as large a down payment as you'd like. What next?

CLARIFY THE PROBLEM

1.
etc.

SET OBJECTIVE(S)

1.
etc.

GENERATE ALTERNATIVE COURSES OF ACTION

1.
etc.

LIST THE ADVANTAGES/DISADVANTAGES ASSOCIATED WITH EACH ALTERNATIVE

1.
etc.

CHOOSE AN ALTERNATIVE

DEVELOP A PLAN OF IMPLEMENTATION

IMPLEMENT PLAN

EVALUATE PLAN

5. HOW CAN TECHNICAL PROBLEM SOLVING SKILLS BE APPLIED TO EXISTING SITUATIONS?

Lee F. is a seed specialist in a rural community. He discusses a problem that one of his clients encountered and how he solved it for them.

"My client saw that many of the corn plants in his field had yellow leaves. He knew that the leaves should be a deep green. Why were the leaves yellow? The corn crop was a major part of my client's income for that year. He knew he had to be careful in making his determination. That's why I was called in for assistance.

My client told me what the problem was--the leaves of the corn plant were yellow instead of a healthy green. Nothing else appeared to be wrong with the plant. We sat down and decided that our objectives were to find out why the leaves were yellow and to implement a correcting strategy. Our next task was to generate a list of possible causes of the problem. Was it a lack of rainfall? Not enough nutrients, or perhaps, the wrong kind of nutrients? It could also be that the crop was infested with insects such as cutworms or microscopic mites, among others.

After critically examining each possible alternative, I determined that the reason the leaves were yellow was a lack of nitrogen. I explained this to my client, and we decided to implement a strategy where the corn plants would receive more nitrogen than they were currently receiving. My decision turned out to be correct, as we found out during the implementation stage of our problem solving process. The leaves on the plants quickly turned green, and my client and I were both pleased.

If applying more nitrogen was not the correct solution, I would have applied a problem solving process to the problem situation again. I know what the steps are in problem solving, and I follow each step carefully. I've found that a crucial error in problem solving is to not follow the problem solving steps again after a solution has failed. If one of my generated solutions fails, I carefully evaluate each step of the process to help me determine how I might do things differently as I attempt to solve the problem."

Lee F. encounters technical problems every day. His job is to help his clients solve these problems. Following specific sequential steps in problem solving is imperative for his success.

6. WHAT ARE SOME OTHER TECHNIQUES FOR SOLVING PROBLEMS?

There are other techniques that you may find useful in technical problem solving. These include:

1. THINKING ALOUD - This technique involves saying your thoughts aloud while attempting to solve a problem. Sometimes it may make your thoughts more clear if you say them aloud. This may help you to identify and determine the significance of key words, phrases and terms.

2. TRIAL AND ERROR - This technique helps in getting a feel for a problem; each trial gives valuable information. Trial and error works best when there are few alternatives available, and if the alternatives are not time-consuming during testing.

3. WORKING BACKWARDS - This technique involves a change in perspective when stating the problem to a given problem situation. Instead of stating the problem first, try stating the goal, what is desired, first and then working back to the present. This method is helpful when you find yourself unable to solve the problem by stating the problem first.

4. BACK BURNER - This technique involves getting away from the problem when you have come to a dead end or exhausted all ideas for approaching a problem. To effectively manage your available time, it may be best to let the problem "set" while you clear your mind and returning to the problem situation after you have had a chance to think things over. In essence, you are putting the immediate problem "on the back burner" and directing your thoughts and efforts on other activities. The problem situation is still evident; you simply are not concentrating on it directly.

INSTRUCTIONAL ACTIVITY #3:

Using the sequential steps in problem solving as outlined in this module, generate several solutions for the following problem situation:

You are employed by a large manufacturer which produces teddy bears. Your responsibility is to place each completed teddy bear in its shipping box as it comes to you on the assembly line. Quality control is taken care of by the workers immediately before you, but if you notice any major defects with the teddy bear, you are to place the defective teddy bear aside and report the problem. One problem that you've identified is that every so often a teddy bear will not have the required bow tie or else it is the wrong color. You've reported the problem to the department in charge of quality control. They say they are checking the products as best as they can. They ask you, "How would you solve this problem?"

And your answer is:

7. WHAT ARE THE TERMS COMMONLY USED IN TECHNICAL PROBLEM SOLVING?

Back burner method: a method of problem solving which is characterized by the problem solver setting the generated alternatives aside momentarily, directing their efforts elsewhere and returning to the alternatives at a later time.

Identification: to establish the identity of an event or fact.

Documentation: the authenticating of procedures which were performed.

Evaluation: to determine the significance by careful appraisal; to compare results against original criteria or objectives.

Organization: a systematic plan of arrangement.

Prediction: forecasting future events or possible outcomes.

Problem: an unsettled question.

Problem situation: a state of affairs which is unsettling or confusing.

Problem solving: the process of coordinating previous experience, knowledge and intuition in an attempt to determine a method for resolving a situation whose outcome is not known.

Plan of implementation: a method of achieving a goal in a problem situation, chosen by the problem solver.

Trial and error: a method of problem solving which is characterized by the problem solver finding the best way to reach the desired solution by trying each generated alternative until one succeeds.

Working backwords: a method of problem solving which involves a change in perspective in that the new starting point is the original goal.

APPENDIX D
TEACHER'S ADDENDUM TO INSTRUCTIONAL MODULE ON TECHNICAL PROBLEM SOLVING

DRAFT - For Field Testing Purposes Only

Project GENTEC
Generic Technical Competency

INSTRUCTOR'S ADDENDUM to

Instructional Module on

TECHNICAL PROBLEM SOLVING

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Developed in part with funding from the
Illinois State Board of Education's
Department of Adult, Vocational and Technical Education
Springfield, Illinois

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INTRODUCTION:

The purpose of this INSTRUCTOR'S ADDENDUM to the GENTEC instructional module on TECHNICAL PROBLEM SOLVING is to provide you, the instructor, with:

1. an overview, definition, rationale and example of the generic technical competency being taught,
2. additional instructional activities which can be used in a classroom setting and
3. additional instructional resources in order to enhance your instructional efforts.

The instructional module is intended to be self contained. The average student should be able to complete the module and learn the competency without outside assistance. The competencies are presented in a logical, understandable and concise form. Classroom instruction should involve:

*lectures,
*open discussion,
*identification of competencies and application to employment situations,
*additional instructional activities,
*and opportunities to ask questions.

However, to enhance the acquisition and retention of the information, as an instructor, your first step is to read and become familiar with the entire student-based instructional module. This INSTRUCTOR'S ADDENDUM is only a supplement to the module.

Second, review the intended learner outcomes of the module. This will help you focus your teaching on the most pertinent aspects of the competency.

Third, enhance your understanding of the competency by reviewing several of the suggested resources/references. Copies of several significant resources have been appended to this addendum for your convenience.

Fourth, prepare a lesson plan on the competency. This should begin by helping students to generate a list of their key questions regarding the competency. You should find that a student-generated list of key questions will match the key questions used in the instructional module.

Fifth, assign the students to read and complete the instructional module.

Sixth, present the lesson. Masters for overhead transparencies have been appended. With some modules, audio and/or video tapes have been prepared to assist with your teaching. These are listed in the RESOURCES/REFERENCES section.

Finally, assess how well the students have mastered the GENTEC competency. This may be accomplished by administering the post-test, which is included in this module.

OVERVIEW OF GENTEC

In today's market of competitive hiring, the prospective employee with the best preparation will get and keep the job. But the best technical preparation is not always measured by occupational proficiency. Certain generic technical competencies are becoming increasingly important. Most vocational educators and occupational trainers will concur that program completers with knowledge, skills and attitudes in generic technical competencies are better prepared to enter and progress within a desired occupation.

GENTEC is a broad-based "capstone" curriculum of generic technical competencies involving critical thinking, sophisticated behaviors and professional attitudes. GENTEC is applicable to all occupational clusters of agricultural, business, health, home economics and industrially-related occupations.

The purpose of GENTEC is to increase students' competence in areas of generic technical knowledge, skills and positive attitudes in order to enhance their competitive edge for job entry and advancement.

Many educators, realizing the importance of generic technical competencies, attempt to provide instruction by integrating time on each topic into an existing curriculum. The problem was that an encompassing curriculum of generic technical knowledge, skills and attitudes did not exist. In addition, succinct instructional materials on specific topics of generic technology did not exist in a readily available form for use in skill level courses on the high school and community college levels (grades 11-14).

GENTEC may be used as a separate curriculum for a specific course or courses. Students in almost any technical "major" benefit from a course on critical thinking skills on a technical level.

Also, GENTEC may be incorporated into a larger skill development curriculum at a logical point. The instructor may spend as much time or as little time as desired.

READABILITY

The Fog Index of Readability was taken at three random points within the module. The range was determined to be at the tenth grade level.

GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Technical Problem Solving

EXAMPLE:

A farmer was facing the dilemma of increasing expenses, decreasing receipts and a declining income. The problem had persisted for several years. What were his options? First, he could try to improve the effectiveness and efficiency of his farm, But he had been doing that for the past 30 years. He felt that he was as efficient and effective as he could get.

Second, he could quit farming. But job prospects for a fifty five year old man without other occupational experiences didn't look too promising. Third, he could investigate the possibility of vastly altering his farming operation. He had recently heard about an increasing market for "naturally grown" foods. Such foods are grown without commercial fertilizers and chemicals. Instead, natural manures are used for fertilizer, and select insects such as lady bugs and praying mantises are used as pesticides. Although much more labor intensive than the grain operation he had previously, his receipts increased and his expenses declined to now provide a larger income for him and his family.

DEFINITION:

Technical problem solving is the process of creating a change to bring extant conditions closer to desired conditions. (Pfeifer & Jones, 1983)

RATIONALE:

It is common to encounter problems many times a day in one's occupational setting. To make the best use of the time allotted in a given day, it is wise to understand the importance of technical problem solving. Using a sequential process of problem solving will assist the individual in maximizing all available information in order to effectively solve a problem.

INTENDED LEARNER OUTCOMES:

A learner who has mastered this competency will be able to:

1. Discuss the concept of technical problem solving.

2. Explain the basic skills technicians need in order to effectively solve problems.

3. List in proper sequence the steps of technical problem solving.

4. Justify the importance of following sequential steps in problem solving.

5. Enact the various techniques that are needed for technical problem solving.

6. Apply the techniques of technical problem solving to a hypothetical situation, generate three or more solutions and evaluate each.

8. Define the terms commonly used in technical problem solving.

RESOURCES/REFERENCES (listed in order from best to least best for instructional purposes):

Krulik, Stephen & Rudnick, Jesse A. (1984). *A Sourcebook for Teaching Problem Solving*. Boston: Allyn & Bacon.

Rickards, Tudor. (1974). *Problem Solving Through Creative Analysis*. New York: Wiley.

Bransford, John & Stein, Barry S. (1971). *The Ideal Problem Solver: A Guide for Improving Thinking, Learning and Creativity*. New York: W. H. Freeman.

Ford, Leroy. (1971). *Using Problem Solving in Teaching and Training*. Nashville: Broadman Press.

Prince, George M. (1970). *The Practice of Creativity: A Manual for Dynamic Group Problem Solving*. New York: Harper & Row.

Grossman, Stephen R. (1984, December). Releasing Problem Solving Energies. *Training and Development Journal*, pp. 94-98.

Staff. (1986, August). Consciousness-Raising for Employees. *Pryor Report*, p. 4.

Solutions: A Guide to Better Problem Solving. University Associates, Inc., 8517 Production Avenue, San Diego, CA 92121.

The Problem-Solving Game, Training House, Inc. P.O. Box 3090, Princeton, NJ 08543-3090, (609) 452-1505.

"What Went Wrong? The Art of Problem Solving," video, United Training Media, P.O. Box 718, 6633 West Howard Street, Niles, IL 60648, (800) 558-9015, in IL (312) 647-0600.

Solving Problems in the Work Place, video, United Training Media, P.O. Box 718, 6633 West Howard Street, Niles, IL 60648-9990, (800) 558-9015, in IL (312) 647-0600.

Ellis, Julie L. Creative Problem Solving Techniques. Monroe, New York: Trillium Press.

Bagley, Michael T. Using Imagery in Creative Problem Solving. Monroe, New York: Trillium Press.

Bagley, Michael T. Using Imagery to Develop Memory. Monroe, New York: Trillium Press.

SELF TEST ON TECHNICAL PROBLEM SOLVING

SHORT ANSWER

1. List the five basic skills needed in problem solving and briefly describe each.

    1.

    2.

    3.

    4.

    5.

2. List two benefits of utilizing an efficient problem solving technique.

    1.

    2.

TRUE/FALSE Circle T or F depending on your feelings to the following statements:

3. T F It is not really that important that you set your objectives as you attempt to solve problems. After all, they'll become apparent as you get closer to the solution.

4. T F The validity of your chosen alternative will depend largely upon how accurate, clear and complete your work has been in the problem solving process.

5. T F Learning to systematically solve problems will eventually help you to effectively manage your available time because you will learn how to not get bogged down by details.

6. T F The trial and error method of problem solving works best when there are many alternatives available.

DEFINITIONS Briefly define the following terms as discussed in the Technical Problem Solving module:

7. Plan of implementation

8. Back burner method of problem solving

9. Alternative courses of action

10. Working backwards method of problem solving

CASE STUDY A hypothetical problem situation is described below. Read the situation carefully, outline the situation using the sequential steps of problem solving as described in the module, and state your solution(s).

As a technician in an automobile manufacturing plant, you are in charge of maintaining the paint robots. Your responsibility is to keep detailed records for each auto as it passes through your department and also records for each robot. The paint robots paint the autos when they arrive in the paint department. There are five paint robots; each able to spray only one color of paint on any given day.

Today was a busy day for the robots in your department. That is, busy for some robots and not so busy for others. The demand for olive green cars is not nearly as high for black or red cars. White cars aren't very popular this season, so the robot which sprays white paint wasn't worked too hard today. As you watch the paint process, you wonder if there isn't a way to utilize all the robots the same amount. The robot in charge of painting black is becoming very run down. Maintenance costs for that robot were astronomical last year. At the same time, the robot which paints white is like brand new. Isn't there a way to spread out the use of the robots?

ANSWERS TO SELF TEST ON TECHNICAL PROBLEM SOLVING

1. Five basic skills needed for problem solving:

1. IDENTIFICATION - You need to know how to identify facts which directly relate to the problem situation. This includes being able to determine what facts are extra and not needed. You should also be able to determine an appropriate method.

2. ORGANIZATION - You need to know how to organize relevant facts surrounding the problem situation. Important facts may be overlooked if you do not have good organizational skills, thus jeopardizing the problem solving methodology. Being able to effectively organize your time during problem solving is a must, also. If you devote too much time to problem solving, it can cause you to become bogged down with details. Likewise, if you don't devote enough time to the methodology of problem solving, the entire process may fail on that element alone.

3. DOCUMENTATION - You need to know how to document facts during all steps of the problem solving process. Each step of the problem solving process depends on clear, concise documentation for future referral.

4. PREDICTION - You need to know how to predict possible outcomes of generated alternatives. Competence with this skill saves time.

5. EVALUATION - You need to know how to evaluate the tested solution in an unbiased manner. Evaluation should be made without any pre-conceived notions of what the "ideal" solution should be.

2. Two benefits of utilizing an efficient problem solving technique: (Students will choose two of the following three.)

1. EFFECTIVE TIME MANAGEMENT: Learning to systematically solve problems will help you to effectively manage your available time. If a problem solver does not spend enough time gathering facts concerning the problem situation, they will not have complete information about the situation. Spending too much time may result in the problem solver getting bogged down with details. There may not be enough time left over to test the solution completely.

2. EFFECTIVE GROUP PROBLEM SOLVING: Efficient problem solvers also understand that enhancing and refining their individual problem solving skills will help them to function more effectively in a group problem solving setting.

3. EFFECTIVE STRESS MANAGEMENT: Haphazard attempts at problem solving create feelings of stress. Those that can apply an effective problem solving method to problems will experience less feelings of stress in an occupational setting and more positive feelings about their abilities.

TRUE/FALSE

3. False

4. True

5. True

6. False

DEFINITIONS

7. Plan of implementation: a method of achieving a goal in a problem situation, chosen by the problem solver.

8. Back burner method of problem solving: a method of problem solving which is characterized by the problem solver setting the generated alternatives aside momentarily, directing their efforts elsewhere and returning to the alternatives at a later time.

9. Alternative courses of action: those possible choices a problem solver has available to use.

10. Working backwards: a method of problem solving which involves a change in perspective in that the new starting point is the original goal.

CASE STUDY:
Answers will vary from student to student.

The PROBLEM is that some robots are being utilized more than others.

The ALTERNATIVES are:
1. Program the robots to be able to paint any color on any given day. Robot would "read" a symbol on an unpainted car, interpret that symbol, and paint the car the specified color.

2. Make backup robots available which will paint the colors requested most.

etc.

SUGGESTED INSTRUCTIONAL ACTIVITIES

* Summarize the value of being able to solve problems efficiently.

* Discuss and describe the abilities, habits, attitudes, understanding and knowledges needed in problem solving.

* Outline how to analyze a problem situation. This includes stating the problem and determining the most critical aspects of that problem.

* Determine methods of collecting valid information when initiating a problem solving strategy.

* Identify and discuss common errors in problem solving and how to avoid them.

* Propose effective strategies of working with others in solving problems.

* Assess various problem solving techniques.

* Instruct students to interview school staff members from departments within their school to identify problems that people encounter. Apply the problem solving process which they have learned from this module to those existing problems.

* Instruct students to identify problems which they have encountered in their own schools and apply the problem solving process they they have learned from this module.

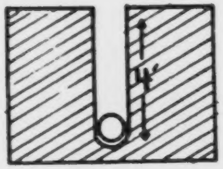
* Instruct students to discuss with various community leaders problems within the community. Students may generate alternatives to the various problems and discuss them with the community leaders.

ACTIVITY 1

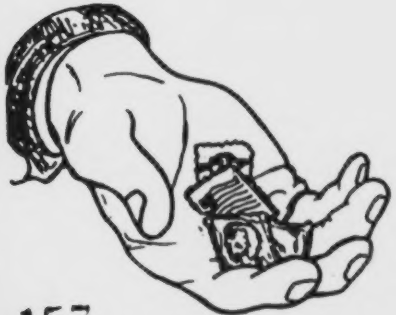
Sometimes a wrong idea can get in the way when it's time to solve a problem. An idea for a solution to a problem pops into your head, and even though it's not the right solution, you try to make it work. As a result, new and better ideas fail to develop.

Read each of these problems. What is the first idea for a solution that pops into your head? What idea will solve the problem?

1. A Ping-Pong ball is in a hole. The hole is just a little bit wider than the ball. The hole is four feet deep. There aren't any long sticks available. How do you get the ball out of the hole?



2. There are four postage stamps in the palm of your hand. You must blow them off one at a time. How do you do it?

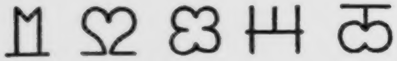


3. Joe says his grandfather is only five years older than his father. Can you explain how this can be?

4. It's easy to make an equilateral triangle with three toothpicks. Right? And you can probably make two equilateral triangles with five toothpicks. Can you? But who can make *four* equilateral triangles with just six toothpicks? Remember, you'll probably have to forget your first idea for a solution.

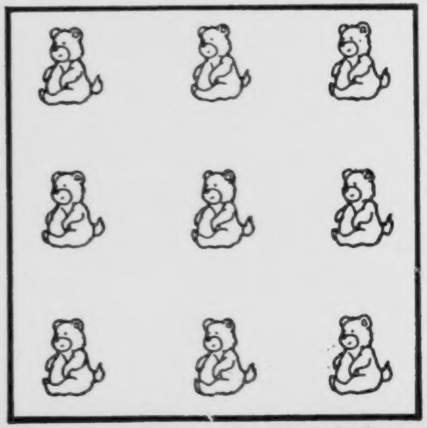
These next problems may seem unreasonable, but they require the same kind of analytical thinking that real-world engineering problems do.

5. What do these symbols represent?

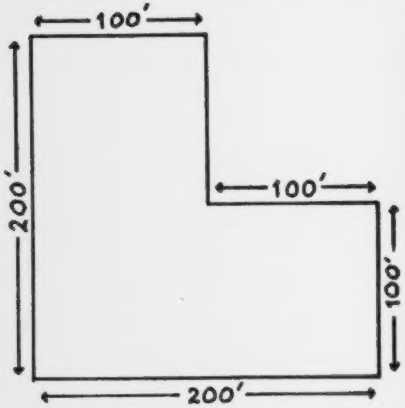


Once you've decided, draw the next three symbols that follow those above.

6. The nine bears in the zoo have been fighting too much lately. Each bear must have its own pen. Since you're the zoo engineer, the zoo keeper has asked you to subdivide the bear enclosure. Can you do the job by building only *two* square-shaped enclosures within the enclosure below? Remember: Each bear needs its own pen.



7. Divide this room into four rooms. Each room must be identical.



ANSWERS TO INSTRUCTIONAL ACTIVITY #2

CLARIFY THE PROBLEM
1. You don't have enough money to purchase your own car

SET OBJECTIVES
1. To generate enough money to purchase your own car

GENERATE ALTERNATIVES
1. Get a loan from your parents or other interested parties.
2. Get a part time job
3. etc.

LIST ADVANTAGES AND DISADVANTAGES FOR EACH ALTERNATIVE
Encourage students evaluate the alternatives, based on their own common sense. Have the students rank the alternatives with the most feasible being first and least feasible being last.

CHOOSE ALTERNATIVE
Encourage students to argue conflicting alternatives so that others may gain experience in evaluating other's choices.

DEVELOP A PLAN OF IMPLEMENTATION

IMPLEMENT PLAN
Since actual testing cannot be performed, have students brainstorm for possible results.

EVALUATE RESULTS
Have students evaluate what could happen and then draw conclusions.

ANSWERS TO INSTRUCTIONAL ACTIVITY #3

CLARIFY THE PROBLEM

1. The Quality Control department needs a better method of checking the quality of the teddy bears.

SET OBJECTIVES

1. To identify a method of insuring that the teddy bears have the required bow ties and that they possess the correct specifications.

GENERATE ALTERNATIVES

1. "Teach" a computer to "see" if the bow tie possesses the correct specifications. This may be done by having the computer compare the actual image of the product with a perfect image in its memory. A teddy bear which is not an exact replica of the perfect image would be flagged and pulled aside.
2. etc.

LIST ADVANTAGES AND DISADVANTAGES FOR EACH ALTERNATIVE

Encourage students to evaluate the alternatives, based on their own common sense. Have the students rank the alternatives with the most feasible being first and least feasible being last.

CHOOSE AN ALTERNATIVE

Encourage students to argue conflicting alternatives so that others may gain experience in evaluating other's choices.

DEVELOP A PLAN OF IMPLEMENTATION

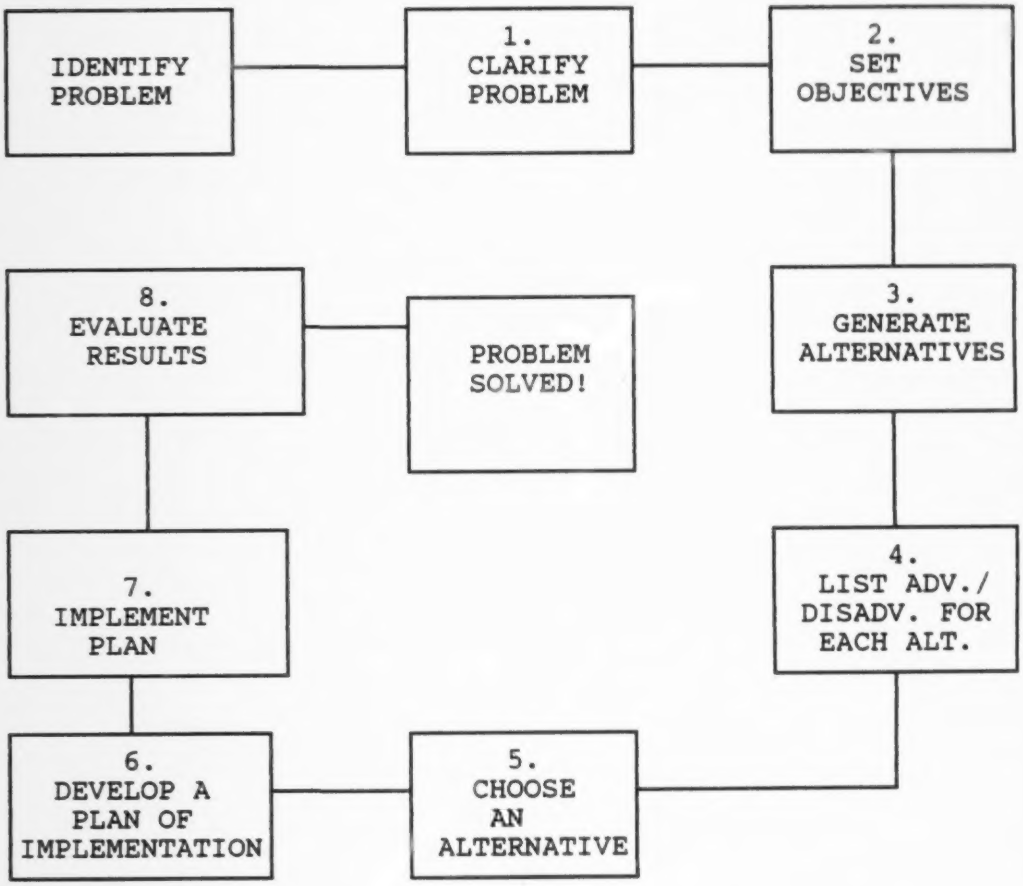
Since actual testing cannot be performed, have students brainstorm for possible results.

IMPLEMENT PLAN

EVALUATE RESULTS

Have students evaluate what could happen and then draw conclusions.

THE PROBLEM SOLVING STEPS


IDENTIFY PROBLEM
1. CLARIFY PROBLEM
2. SET OBJECTIVES
3. GENERATE ALTERNATIVES
4. LIST ADV./ DISADV. FOR EACH ALT.
5. CHOOSE AN ALTERNATIVE
6. DEVELOP A PLAN OF IMPLEMENTATION
7. IMPLEMENT PLAN
8. EVALUATE RESULTS
PROBLEM SOLVED!

TRANSPARENCY MASTER #2

CLARIFY THE PROBLEM

SET OBJECTIVE(S)

DEVELOP ALTERNATIVES

EVALUATE THE ALTERNATIVES

LIST THE ADVANTAGES/DISADVANTAGES ASSOCIATED WITH EACH

CHOOSE AN ALTERNATIVE

DEVELOP A PLAN OF IMPLEMENTATION

EVALUATION

FINAL REPORT

GENTEC - PHASE II: A CURRICULUM AND INSTRUCTIONAL MATERIALS ON TOPICS OF GENERIC TECHNOLOGY

VOLUME II - INSTRUCTIONAL MODULES
APPENDICES E - H

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Supported in part by the Illinois State Board of Education
Department of Adult, Vocational and Technical Education

July, 1988

APPENDIX E
INSTRUCTIONAL MODULE ON PRODUCTIVITY

DRAFT - For Field Testing Purposes Only

Project GENTEC
Generic Technical Competency

Instructional Module on

PRODUCTIVITY

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INTRODUCTION

I had recently been hired as a carpenter's assistant in a small woodworking shop when my boss brought me my first solo project. Someone had ordered a shallow, square box to hold a phonograph turntable. The project was simple enough; just follow the sketches that the Boss and the customer had worked out. Plywood with walnut veneer. Mitered corners. Free-form cutout on top to accommodate the turntable. I knew exactly how to build it.

I knew woodworking. I had learned it in school. I knew the machines, the techniques, and the safety rules. I had produced a number of quality projects in school, ranging from walnut tables to redwood fences.

The problem came when my boss said that I had to build the project in no more than one hour. He had given the customer a price estimate based on his calculations that the materials should cost about 1/3 of the estimate, my hourly pay was another third and the final third would go to the shop. If I took too long, or if I made a mistake and had to start with new materials, the shop wouldn't make any money. I had to do it right, and I had to do it right the first time. I knew I could produce, but could I be productive?

My experience in the woodworking shop raised questions not only about my own productivity, but other questions as well. What is production? What does it mean to be productive? Can a person improve their own productivity? How can a person be more productive? Why should a person be more productive?

The purpose of this GENTEC module is to help you explore these and other questions. By doing so, you will be able to increase and improve your own productivity in your career as well as in your personal life. By increasing and improving your own productivity, you will be more successful in your occupation and personal interests.

When you complete this instructional module, you will be able to:

- Describe the importance of improving occupational productivity.
- Use personal skills to improve personal productivity.
- Initiate these skills on your own.
- Display positive attitudes toward personal productivity by taking responsibility, making the effort, and acknowledging rewards for increasing productivity.

How can you be more productive? First, what are your opinions about human productivity? Take a few minutes to complete the following opinionnaire. This is NOT a test; there are no RIGHT or WRONG answers. It only asks for your opinion. Simply circle your choice on each item.

1. "Production" and "productivity" are about the same.
Disagree 1 2 3 4 5 Agree

2. Being productive causes good feelings of accomplishment, competence and self-fulfillment.
Disagree 1 2 3 4 5 Agree

3. The harder I work, the more productive I am.
Disagree 1 2 3 4 5 Agree

4. The more productive I am on a job, the more money I will make.
Disagree 1 2 3 4 5 Agree

5. Economists can measure productivity by analyzing the relationship between inputs and outputs.
Disagree 1 2 3 4 5 Agree

6. Most people do (produce) just enough to get by.
Disagree 1 2 3 4 5 Agree

7. As a worker, I have almost no control over how much I produce.
Disagree 1 2 3 4 5 Agree

8. Most people don't want to be productive in their jobs.
Disagree 1 2 3 4 5 Agree

9. Most people could be more productive in their jobs than they currently are.
Disagree 1 2 3 4 5 Agree

10. One way to be more productive is to be less "destructive."
Disagree 1 2 3 4 5 Agree

11. It is possible to work less, yet produce more.
Disagree 1 2 3 4 5 Agree

12. People who are self-employed don't need to worry about being productive because they are their own bosses.
Disagree 1 2 3 4 5 Agree

This module is designed to provide answers to the following key questions:

1. What is occupational production?
2. What is occupational productivity?
3. What is human productivity?
4. Why should I be concerned about my own productivity?
5. Should technicians be concerned about increasing the quantity or improving the quality of goods and services?
6. How can I increase my productivity?
7. How can I know if I'm productive?
8. What are the incentives or rewards for being productive?
9. Don't most people produce just enough to "get by"?
10. What about people who are counterproductive?
11. What are the terms commonly used when discussing productivity?

1. WHAT IS OCCUPATIONAL PRODUCTION?

First of all, what is production?

Production is the act of making, creating, or providing something. In a business, you might produce a thing, create a design, or provide a service. As a hobby, you could paint a picture, create a flower arrangement, or teach a friend how to play tennis. You produce, regardless of whether you're on the job or not. Being productive is a natural human trait. It leads to a sense of acomplishment, achievement and pleasure.

Occupational production occurs on the job. You might create "goods" or you might provide a "service." Goods are things that are consumed, such as food, clothing, shelter, cars, toasters, and yes, even base cabinets for phonograph turntables. Services include such things as teaching, entertainment, advertising, sales, fire protection, and health care. All of these goods and services satisfy human wants.

PRODUCTIVITY PROFILE

How do people who are self-employed view productivity? The following may provide some insights.

Bob M. is a graphics designer and operates his own business out of his home. He talks about his work productivity:

"My productivity? When you're self-employed, you have to be productive. If I don't work -- I don't eat. Nobody else is going to do the work for me.

On the other hand, the harder I work -- the better I eat, so to speak. If I really hustle -- that is, do more advertising, sell more design jobs, deliver on time with a little extra -- this business can grow and really be rewarding.

On my most productive days, you'd probably think I hadn't produced a thing. You'd look around my studio and see very little new, except maybe some sketches or doodles. That's the first step: producing ideas, not things. I'm a creator. I create layouts for publications and promotional materials and logos for institutions. When I'm really productive, I generate a lot of ideas.

The next step you can see. That's when I begin to draw. Or maybe I'll produce some photographic materials. Some ideas are best put in three-dimensional models. It depends on the medium. You can see this type of production, and that's what my client sees. They don't see the ideas; they see the rendering of those ideas into graphics.

How productive have I been today? Not very. I finished up a couple of renderings that clients wanted changed a bit before sending them to the printers. I do, however, feel a sense of completion.

But tomorrow! Tomorrow I start on a whole public relations program for the local hospital. I already have some images in mind. First, I'll clarify some basic concepts that the hospital wants to get across to the public. Then I'll create some images to try to convey those concepts. Tomorrow, I'll be very productive."

----

2. WHAT IS OCCUPATIONAL PRODUCTIVITY?

The answer depends on whom you ask.

If you ask an economist, they will probably give you the following formula:

$$\text{PRODUCTIVITY} = \frac{\text{OUTPUT}}{\text{INPUT}}$$

What's an output? What's an input?

Inputs — Production Process — Output

An output is that which is produced -- a "good" or a "service." In the woodworking shop experience, the output was the base cabinet for the phonograph turntable. The cabinet was a "good."

Inputs are all those things necessary to produce the output. With the base cabinet, the inputs included wood, nails, screws, wood glue, saws and sanders, electricity to power the equipment, the building which housed the equipment, advertising in the YELLOW PAGES of the telephone book which brought the customer, in and the producer's skills and time. Economists categorize these inputs in various ways. One common way is:

The Six "M"s of Inputs:

1. Materials
    - -non-consumable materials (wood, glue, screws, nails)
    - -consumable materials (electricity)
2. Machinery (saws, sanders, building, tool technology)
3. huMan (people power such as time, effort, capabilities, attitudes, expertise)
4. Methods (procedures, techniques, craft)
5. Money (payroll, interest, taxes, facilities)
6. Management (advertising, directing staff, policies, atmosphere)

Using the formula above, if you sell the output for $100 and the inputs cost $100, you have "broken even" -- you have neither made nor lost money. Then why do it? In order to make money, that is, "make a profit," you must either increase outputs, decrease inputs, or both. If you can now sell the output for $110 and have reduced input costs to $90, you will have made a $20 profit.

Beware of the reverse situation: the price for the output goes down and/or the cost of inputs goes up. If the output prices decrease to $99 and the cost of inputs increases to $101, you're losing $2 on every output. You're also heading for financial bankruptcy.

Another way to view productivity is to analyze output based on each type of input. For example, output per unit of materials, machines or human. When economists say that worker productivity has declined, they mean that the cost of labor has increased without a corresponding increase in output. In other words, workers are less productive.

People who produce "services" have yet a different perspective on productivity. They will probably tell you that productivity is anything that improves performance or lowers costs. Performance is an output while costs are an input of the service industry. Therefore, if you can improve or increase outputs as well as decrease inputs, the level of productivity has increased.

INSTRUCTIONAL EXERCISE:

From your own experience, list an "output" you have produced. Next, list as many "inputs" as you can think of used to produce the output.

Output:

Inputs:

3. WHAT IS HUMAN PRODUCTIVITY?

In simple terms, human productivity is the amount of output that people can produce. In economic terms, human productivity is the output (the quantity and quality of goods and services) in relation to human time, usually measured in hourly wages.

Human productivity should also be of interest to you personally. Everyone uses at least a portion of their leisure time to produce a good or service. By simply preparing a meal, you are "producing." Other examples range from raising vegetables in a garden (a good), to being a foster parent (a service); to assembling a stamp collection (a good).

Whether in your occupational (work) life or in your personal life, one thing is true: YOU CAN ALWAYS BE MORE PRODUCTIVE.

INSTRUCTIONAL EXERCISE:

From your own personal experience, list a good and a service you have produced or provided in a job.

JOB: ________________________________

good:

service:

PRODUCTIVITY PROFILE

The following provides an example of human productivity in a "service" occupation.

Roger M. works in city government as a clerk in an office. He's worked there over thirty years.

"Am I a productive worker? I think so. I guess that depends on what you mean by being productive. We don't make anything here; instead we process people's applications for tax adjustments. I help people fill out their forms. I provide a service. It's a lot easier to help people fill out the forms right the first time than to have to correct them later. We don't advertise for business. People know we're here. When they need us, they'll come to us.

I've increased my productivity by talking to people before they start filling out their forms. When I know their circumstances, I can guide them by giving them the exact information they need. Everyone doesn't need the "whole load of hay." Listen first; then give them the information they need."

4. DOES WORKER PRODUCTIVITY INCREASE THE QUANTITY OR IMPROVE THE QUALITY OF GOODS AND SERVICES?

Both!

In the production of goods, it is of no benefit to increase the number of goods produced if the number of defects or unsalable goods goes up at a faster rate. It may be more productive to work at decreasing the defect or error rate (increasing the quality) yet maintaining the number (quantity) of goods produced. The result would be an increase in productivity. It would reduce the number of items returned because of defects.

For example, a production line assembling "widgets" could be sped up to increase production by 10%. But if more errors are made on the assembly line because of the increased speed, the number of faulty "widgets" returned by dissatisfied consumers could increase by 15%. Although the production line increased production by 10%, the company is faced with a total decrease in productivity of 5 percent.

In the provision of services, it is likewise of no benefit to increase the number and variety of services if the responsiveness and adequacy of those services decreases. For example, a municipality could hire twice as many police officers, but if the additional salaries reduce the amount of money available for training, the municipality may be faced with half a police force which is not well prepared to provide security and protection. Although the quantity of police protection increased, the quality decreased. The productivity of the police force possibly could have been increased or improved by providing existing officers with additional training.

It is important to remember that improving your human productivity involves both the increasing of quantity and the improving of quality of goods and services.

PRODUCTIVITY PROFILE

The following provides an example of where both quantity and quality are vital.

Sonja K. is a medical laboratory technician. She has worked at a major medical center in a large metropolitan area, but for the past six years has worked for a comprehensive hospital in a midwestern city. At the end of a double shift, she sits. And talks.

"My legs are killing me! Feels good to get off my feet and prop them up. Most people probably think that a "Tec" (medical laboratory technician) sits all day at a laboratory counter. Not so. We stand at a laboratory counter.

I hadn't planned to work two shifts. Then two of the other Tecs called in and said they couldn't make it to work. I was glad to cover for them. Someday I may need the same favor in return, who knows?

My first shift was quiet. Boring, in fact. Time moves so slowly when there's nothing to do. You read and you talk -- but you can't leave. You have to be ‘on board.' My second shift was busy. We were really ‘humming' there for a while. The doctors had ordered a batch of tests to get ready for surgery and there was a run of accident victims.

I feel good about the shift. I'm tired. But I feel like we accomplished a lot. I feel satisfied.

We double checked every procedure we ran. Not one mistake! 100%. That's important because we're dealing with people's health and their lives. That's why I do this job. It's important.

Oh, the pay is good, too. And I can land a med. tec. job anywhere. But I'm always thinking about the patients. The doctors depend on me. The floor nurses depend on me. So do medical records. If I give them wrong information, they'll make wrong diagnoses. That hurts people. I may never see the patients, but I know they're out there. And they're depending on me to do my job perfectly. Blind trust. And at the end of the second 8-hour shift, I have to be just as accurate and precise as I was at the beginning of the first shift. It makes me feel competent. I can do that lab procedure better than anyone else in the hospital, including the doctors. That's a good feeling.

We achieved something. Two tecs short means we each get more work than usual."

---

5. WHY SHOULD I BE CONCERNED ABOUT MY OWN PRODUCTIVITY?

As a worker, you contribute to three levels of productivity:

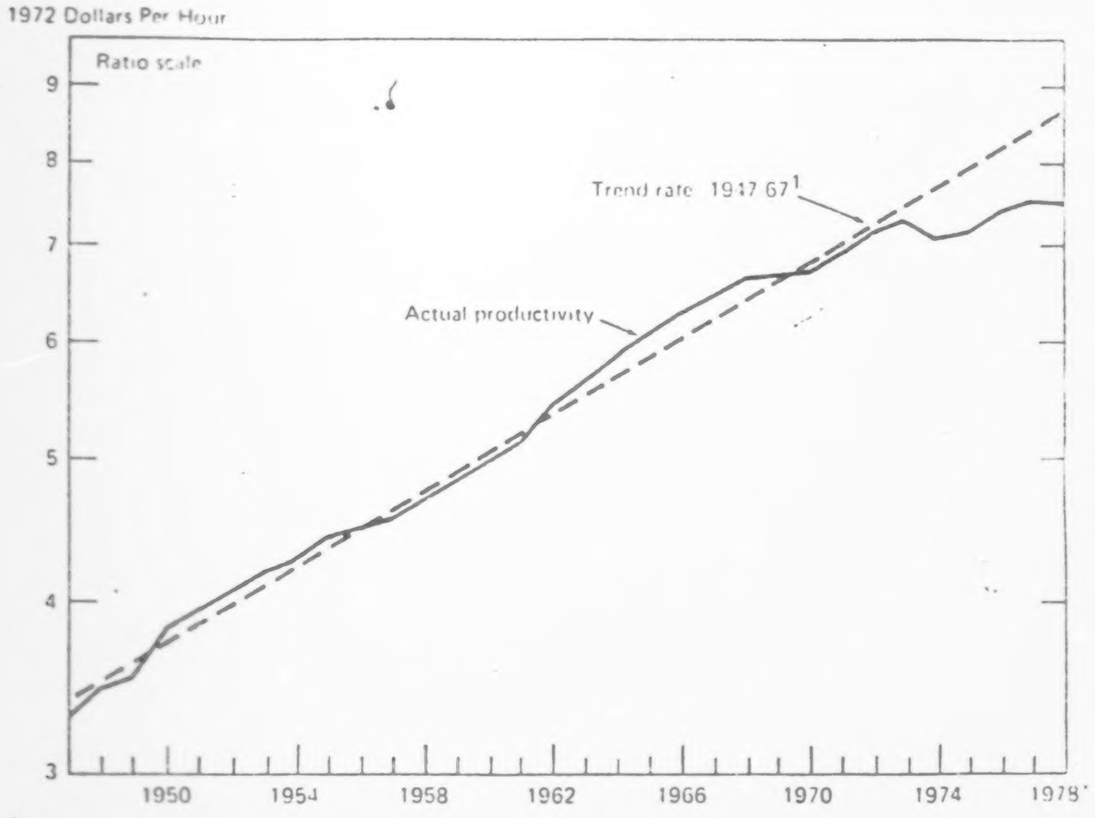
(a) Your own personal productivity.

(b) The productivity of the organization for which you work.

(c) The productivity of the nation.

For the USA, our rate of annual increase in productivity has decreased during the past few years. As you can see in the following graph, the annual increase in productivity in the private business sector grew at about 3.2% each year from about 1947 to the late 1960's.

From the late 1960's to the early 1970's, the rate dropped to 2%. During the late 1970's, the rate dropped to 1% and down to .04% in 1980.



[1] Growth rate of 3.2 percent per year

Source: U.S. Department of Labor, Bureau of Labor Statistics

As an individual, you should be interested in improving your productivity. Most people don't want to work harder, we want to work "easier"--yet produce the same amount. It's not that we're lazy; we're just ingenious. And we search for ways to do the same thing with less effort, in less time, with less trouble, with fewer resources. We want to produce as much, yet produce it with fewer inputs. That's called "increasing your human productivity."

When we realize we have time, energy, and resources left, we begin to increase the quantity and improve the quality of what we produce. And that increase in productivity produces personal rewards such as money, status, and positive feelings about ourselves and others.

Whether self-employed or employed by someone else, you work for an organization. It may be a company, a business, an institution, a governmental agency or another industry. The ability of any organization to provide the quantity and quality of goods or services expected by consumers depends on your contribution regardless of your position.

While the economic productivity in this nation has slumped, the economic productivity in other nations, such as Japan and West Germany, has increased. In a global economy, our slump in productivity is resulting in the loss of jobs and economic security in our nation. In other words: UNCLE SAM WANTS YOU TO INCREASE YOUR PRODUCTIVITY.

6. WHAT ARE THE INCENTIVES OR REWARDS FOR BEING PRODUCTIVE?

Incentives and rewards for being productive are different for every person. But most people receive both external and internal rewards for being productive. The predominant external and internal rewards are:

External Rewards

More Money: In most cases, the more productive you are, the more money you will earn. Productive organizations seek and reward productive employees. Productive people produce more goods and/or services. Therefore, they have more value than unproductive people.

Job Security: Productive people are of more value to an organization, so they'll be retained longer than non-productive employees. Your productive performance ensures that your job and pay will be more secure.

Upward Career Mobility: Generally speaking, the more productive you are, the faster you will climb the "organizational ladder." Being promoted up the ranks of an organization is a direct result of quality performance and productivity.

Internal Rewards

Being productive produces good feelings. These positive reactions make you feel good about yourself and about the world around you.

Being productive causes feelings of satisfaction: a calm, "settled" feeling of having exerted extra effort; of success; of completion.

Being productive elicits feelings of achievement: of having "won"; of accomplishing something important to you and to others.

Being productive produces a feeling of competence: of being able to do what you do very well; of being able to do your job as well as, or even better than, anyone else; of being the best there is.

The positive feelings of being productive are when your "insides" tell you:

CONGRATULATIONS SELF, THAT WAS A JOB WELL DONE!

External rewards tend to be more tangible. They can also be more elusive. Once achieved, they sometimes lose their value. But internal rewards are self-fulfilling and will bring you gratification throughout life.

List an internal and external reward that is important to you.

INTERNAL REWARD	EXTERNAL REWARD
1.	1.

7. HOW DO I KNOW IF I'M PRODUCTIVE?

Imagine yourself at a micro-computer. Switch the computer ON. The following appears on the screen:

Hello. I am a Productivity Analysis Computer. PAC for short. What's your name?

Carroll

Hello, Carroll. Are you ready to analyze your productivity at work today?

Yes.

OK. Here we go, Carroll. My first question is:
Were you productive today?

I sure was.

Good! My second question is:
What did you produce today?

Well . . .ah . . . I was busy all day.

I know that, but what did you produce?

The time just flew by. I was working away when I glanced up at the clock, and it was already time for lunch.

I know that, but what did you produce?

Well, I finished everything that the Boss gave me to do.

But what did you produce?

Hey! Now listen here PIC or PUC or whatever your name is. I handled every client that came through that door today. They came in expecting to find out about their applications. I located their applications, told them of their applications' status, and suggested things they might do to improve. I treated every client equitably and with courtesy and respect. I provided them with a quality service. Several of them thanked me for my help as they left. They were extremely satisfied. Some said they had recommended our service to their friends. Clients are coming to us rather than to the other service down the street. So there.

I know that, and I'm proud of you.

Thanks, I think.

My third question, Carroll, is:
Could you have done your job easier?

What do you mean?

Could you have done what you did easier? With less effort? In less time? Could procedures be streamlined? Could the application forms be simplified? Could you do more with less?

Let me think. The problem now is that I can only work with one client at a time. If I were to write up the most common recommendations that I give, I could possibly duplicate that. Yes! Then after I looked at an application, I could indicate the specific recommendations for that particular application. And let the first person read while I talk with the next client. Sure. I could help two or more clients at the same time.

What would it cost to do that?

Very little. A little time to write it up. The cost of duplication. Negligible cost considering the quicker service it would give my clients, and the amount of time it would save. And my time is money.

I know that.
When can you create this list of recommendations?

First thing tomorrow morning.

Excellent. You helped a lot of people today. You were very productive.

I know that.

Well done, Carroll

Thanks, PAC.

How can you tell if you're productive? Ask yourself the same questions that PAC asked. They are:

Were you productive today?

What did you produce?

Could you have produced more?
With less?

INSTRUCTIONAL EXERCISE:

Carroll has just analyzed a level of productivity. Now it's your turn.

Were you productive today? Yes or No

What did you produce? (Describe the product, good, or service as precisely as you can.)

3. Could you have produced more? YES (No one can answer NO to this question.) How? (Describe.)

Could you have produced more with less? YES (Here again, a NO answer is not possible.) How? (Describe.)

8. HOW CAN I INCREASE MY PRODUCTIVITY?

First, accept the belief that you *can* increase your productivity. Everyone can *always* improve productivity. There are no limits: not time, not energy, not skills, not technology. There are no boundaries to your productivity. The only limits are those in your own mind; those that you impose upon yourself.

Now, here are some "Do's and Don'ts" on how to increase your productivity.

1. *Do something that matters*; don't waste your efforts on something that won't make a difference.

What matters to you? Only you will know that. But most people find meaning and relevance in that which improves the human condition; in that which is of importance to people's lives.

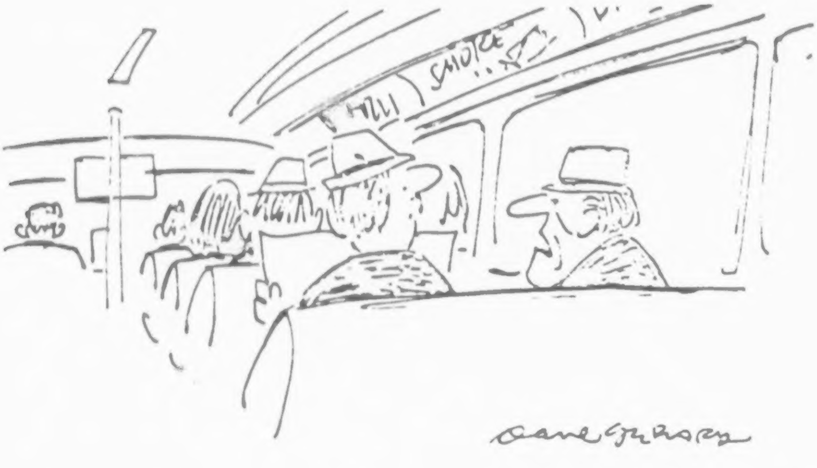
You will be more productive with those things to which you are deeply committed. If you're determined to make a difference--that is, to solving a problem, to improving a situation, to filling a need--you will be productive. And you will be more committed to those things which make a difference; that which matters.

When you commit to significant purposes, you will find that your level of productivity will increase and will remain high. When your efforts are of value to other people, your positive feelings will be magnified.

2. Do be open to change; don't simply maintain the status quo.

Increases in productivity come only with change--change in materials, change in management, change in machinery, change in human power, change of some kind. You won't be able to increase your productivity by doing everything the same old way.

Be creative on your job. Look for new ways of doing things: design new techniques, devise new devices, try new materials, attempt new approaches. Try to do things easier, faster, better. Seek training. Seek retraining. Don't accept the old ways as necessarily the best. Learn from them, but don't die with them.



"Lived in this town seventy-five years. Seen a lot of changes and fought every damn one of them!"

3. Do associate with productive people/organizations; avoid people and organizations that just want to "get by."

People tend to fall into three general categories:

(a) Those that want to be productive and are.

(b) Those that want to be productive but aren't.

(c) Those who don't care either way.

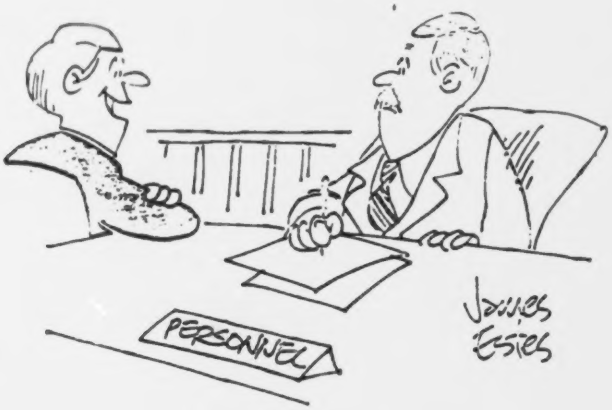
Associate with the first group; avoid the last two. Productive people are always searching for people who are also productive. Your productivity will be wasted on the latter two groups.

4. Do focus on the results of productivity, not on the process of production.

> Three men on a work site were observed moving bricks from one stack to another. Each was asked what he was doing. The first replied, "I'm picking up these bricks and stacking them over there." The second indicated he was making minimum wage. The third stood erect and announced, "I'm helping to build a cathedral!"

What is the goal? If the goal is to provide people with the best quality product or service for the money, you will begin to increase productivity. If, however, your "goal" is to meet a deadline or merely achieve a quota, you will be focusing on the process of production, not on the results.

When you focus on "building cathedrals," you'll continually increase your productivity. But if your only interest is in the money or the process, you'll probably produce, but you won't necessarily be productive.



"My ultimate goal? Retirement."

5. Do sub-divide large efforts into achievable, sequential stages or steps, and don't over-postpone your rewards.

What are the logical steps or objectives necessary to achieve your goal? By sub-dividing a large goal into several intermediate objectives or steps, you will also be able to arrange the steps into a logical, progressive, and productive sequence. Doing the right things but at the wrong time can be counterproductive.

Do the right things, do things right, and do the right things right.

Most people have trouble deferring their rewards for a long period of time. Regardless of how important a large effort is, we need to receive some satisfaction along the way. Each step or objective should have a "real" outcome, an observable result which will bring satisfaction within itself. The completion of each step should provide good feelings.

6. Do prioritize your efforts.

Of several things before you, which is the most important? Least important? Focus on the most important; put the least important aside. What is the "highest and best" use of your time? Your energies? Your talents? Don't drain off your time, energies, and talents on something that is irrelevant. Do first things first.

7. *Do get organized*; don't "clutter" your efforts.

Have you ever decided to pay the monthly bills only to spend most of your time looking for a pen to write out the checks? The "result" was to pay the bills; locating a pen was part of the "process." The process of finding the pen may have taken more of your time and energy than actually writing out the checks.

Get organized. Organize the things you will need in the productive process: materials and machinery. Have a place for everything, and have everything in its place. Then you'll be able to focus on the results of productivity, not on the process.

PRODUCTIVITY PROFILE

The following profile gives another perspective on improving your own productivity.

"Buddy" A. has been in the landscaping and greenhouse business for over 50 years. He is a tall, stocky man with a contagious grin and a hint of mischief in his eyes.

"You have to keep up-to-date in this business. If you don't, you'll go out of business. There's a lot of competition. Anyone with a small parcel of land will start growing something: shrubs, small evergreens, yews, potting plants. And labor costs keep going up.

This all started by chance for me while my brother and I were in high school. My uncle had died, and my aunt was looking for some flowers for his funeral. There wasn't any florist in this small town so everything was trucked in. Well, my mother had planted some geraniums in the back yard. So my brother and I cut a bouquet of those geraniums and took them down to the funeral home. Our aunt was so pleased she insisted on paying us for them. The funeral home director saw what we had done and told us he'd buy whatever we would bring. We thought that was a good deal--growing flowers in the back yard and selling them to the funeral home. We planted more and sold everything.

The next season we rented a few acres on the edge of town and planted flowers and other annuals. We even started a few vegetables in the house in the early spring for transplanting later. We had a knack for growing plants. We did this all the way through high school.

The business kept growing from there. Soon we were into perennials, potted vegetables, garden transplants, shrubs, garden stock, and landscaping supplies. The business has grown, literally. We're now one of the largest greenhouse and landscape retailers in the state.

School? I never went to college and earned a degree. Over the years, though, I've taken every course I could find. But there's hardly a technical topic in this business that I haven't explored. Fertilizers. Insecticides. I'm certified by the State Department of Agriculture to buy and apply pesticides. When I hear about something new, I chase it down. Soil chemistry. Seed hybrids. Mulch pH. Water chemistry. Residential landscape design.

I'm always looking for ways to improve the business. New products. New markets. New production techniques. You have to keep your eyes open. I read things like research reports and seed catalogs. I go to every conference and meeting that has some potential. And when I go, I have a list all made out of the things I'm going to investigate. There's only one way to get better answers, I always say, and that is to ask better questions. So I have my questions ready."

----

9. DON'T MOST PEOPLE PRODUCE JUST ENOUGH TO "GET BY?"

No! Surveys have revealed that of all the American workers:

* 75% would prefer to continue working even if they could live comfortably without working for the rest of their lives.

* 78% feel that they have an inner need to do the very best job they can regardless of the pay.

* 82% say they have some degree of discretion and control over the effort they give to their jobs.

* 88% say they have control over the quality of the good or service they perform.

* 7% feel that work is merely a "business transaction" of exchanging "effort" for "pay."

In other words, Americans tend to like to work, believe there is more to working than merely pay, and have control over the amount of effort they exert and the quality of what they produce.

IF THE ABOVE IS TRUE, WHY IS AMERICAN PRODUCTIVITY SLUMPING?

The answer appears to rest in the incentives and rewards for increasing productivity. Many organizations may not understand, and thus will not be able to provide, the external and, more importantly, the internal rewards of increasing productivity. In addition, American workers, regardless of whether they are in management or labor, are not able to articulate exactly what they want from their work; they may not be able to describe which incentives they desire and what rewards are the top priorities for them.

You, as a worker in our society, must know precisely what you want and expect from your work efforts. You must be clear in your aspirations. You must know which incentives and rewards are important for you. When you know, you can then effectively communicate them, and seek them in finding the "right job" in the "right company." Knowing what you want and how you can get it is the first step in increasing your own productivity.

"I'm unwinding on company time because that's when I got wound up."

10. WHAT ABOUT PEOPLE WHO ARE COUNTERPRODUCTIVE?

Unfortunately, there are some people who insist on being counterproductive. They disrupt the flow of work, abuse equipment, abuse organizational privileges, change jobs frequently, sabotage the production process, pilfer materials and supplies, show up late, leave early, don't show up at all and so forth. Such people are destructive to productivity. In effect, they cancel out the productive efforts of other people.

WHAT CAN I DO ABOUT THEM?

First, don't be guilty of being counterproductive yourself. In-house "crime" costs millions of dollars annually. It costs organizations money. It costs the nation money. It costs you money. As consumers, we all pay more for a good or service simply because of someone else's destructive behavior. Regardless of the color of your collar -- white, blue, pink, whatever -- "collar crime" costs everyone.

Second, most organizations continually search for those who are counterproductive. When located, a three-stage process of TALK - TRAIN - TERMINATE may result. A conference with the counterproductive worker is held to discuss the problem. This conference is often followed by training in an effort to redeem the worker. If talk and training are unsuccessful, the person is fired.

Third, cautiously confront counterproductive workers with the behavior you observed. "When you rob the organization, you also rob me." Often when people realize that their "crime" is obvious to others, they stop. Or they realize that their rationalizations of why "the company owes it to me" are really unfounded and selfish.

PRODUCTIVITY PROFILE

The effects of counterproductivity are shown in the following:

Jim L. works in the quality control department of a large food-processing plant. He is in his late 20s. His blonde hair is pulled back into a knob at the nape of his neck.

"Am I productive? Not now. I just got furloughed for a couple of weeks. They had to shut down the plant because of a trace of strychnine found in the corn hopper. Rat poison. I found it in a routine lab check.

We make food supplements here. We grind up corn, wheat, oats, some rice, other grains. We mix it with dried milk powder or dried egg powder, a dash of salt, maybe some trace minerals and sell it to hungry countries. They mix it with water. Presto! An instant, balanced, complete meal. Or we sell it to other food processors. We can vary the composition to meet any specs.

My job is quality control. I continuously run a number of checks while we're in production and check a number of things: digestible protein content, fat content, carbohydrate level, foreign material and others. That's how I found the strychnine and traced it back to the corn hopper.

How did the strychnine get in there? Some say it was contaminated in the farmer's field. Others say it was shipped in a contaminated railroad car. Others say it was an accidental spill along the way.

I know it was sabotage. Someone out in the plant. We've been having some labor disputes. Someone wanted to get even. I quality checked that carload when it first arrived. The color was bleached from having been rained on in the field. But the corn was clean. It was sabotage.

So to protect the consumer, the management had to shut the whole plant down for at least two weeks. They'll have to dispose of the contaminated corn and wash out the hopper and restock the corn. The only ones that will be working are those few who will be draining, washing, and refilling the hopper. Everyone else gets an unpaid vacation. I didn't want a vacation now. I want the work because I need the pay. We've got payments to make on our home. I just remembered. This shutdown will also reduce my profit sharing. What a bummer!

Could be worse. Three years ago an employee -- correction, a former employee -- torched the back side of the mill. They caught her, but we were shut down for over three months. It hurt the employees and the local merchants, hurt the whole town. We had to increase the market price of our formulations. Everybody lost.

They'll catch whoever did this. Some day. Some way. But the damage is already done."

----

11. WHAT ARE THE TERMS COMMONLY USED WHEN DISCUSSING PRODUCTIVITY?

Counterproductive employees - those that are destructive of the productive process.

External rewards - positive feedback in tangible form, such as a monetary bonus or additional vacation time.

Goods - things that are consumed such as food, clothing and shelter.

huMan - people power involved when producing including such things as time, effort, capabilities, and attitudes.

Input - those things which contribute to a finished product in the production process.

Internal rewards - positive feelings one experiences after having produced/done something constructive.

Machinery - apparatus used in production.

Management - those responsible for the efficient and effective production and distribution of goods and services provided by the organization.

Materials - nonconsumable and consumable materials required in the production process.

Methods - the specific procedures followed in the production process.

Money - the payroll, interest, taxes, and facilities involved in financing the production process.

Organization - functional structure of people joined together with a common interest or common goal.

Output - something produced.

Participatory management - a type of administration where nonmanagement level employees are given a voice in the process of administration within the company.

Productivity - the state of being productive.

Production - the making of goods or services available for human wants.

Service - that output which contributes to the welfare of others.

SUMMARY

The purpose of this GENTEC Module has been to help you explore various aspects of human productivity. We have attempted to answer several question regarding your own economic and personal productivity. By doing so, we hope that you:

*understand the nature of economic productivity,

*realize that you can increase your own occupational and personal productivity,

*know how to increase and improve your productivity,

*and know how to deal with people and organizations that are simply unproductive or even counterproductive.

The most important objectives are:

to help you realize your own human potential,

to place you in control of increasing your own productivity,

to help you be more successful in your career,

and to help you garner greater satisfaction from your efforts.

Have we achieved these objectives? The answer is now in your hands.

Choose to be productive!

For additional information on WORKER PRODUCTIVITY, please refer to one or more of the following:

"People And Productivity: We Learn From The Japanese", video, United Training Media, 6633 W. Howard Street, Niles, IL 60648, (800) 558-9015, in IL call collect (312) 647-0600.

"The Case For Productivity", video, United Training Media, 6633 W. Howard Street, Niles, IL 60648, (800) 558-9015, in IL call collect (312) 647-0600.

The Productivity Sourcebook, Edited by Richard Beatty, John Bernardin and James Nickel. Order from: Human Resource Development Press, 22 Amherst Road, Ameherst, MA 01002, (413) 253-3488.

"Productivity of Japanese Industry", video, Britannica, Training and Development, 1488 South Lapeer Road, Lake Orion, MI 48305, (800) 554-6970, in MI call collect (313) 693-4232.

"High Productivity-How Matsushita Does It", video, Britannica, Training and Development, 1488 South Lapeer Road, Lake Orion, MI 48305, (800) 554-6970, in MI call collect (313) 693-4232.

Quinn and Staines. Quality of Employment Survey, Survey Research Center, University of Michigan, 1977.

Public Agenda Foundation. Pilot Study, 1982.

"Autonomous Working Groups: Smarter Together", video, Britannica, Training and Development, 1488 South Lapeer Road, Lake Orion, MI 48305, (800) 554-6970, in MI call collect (313) 693-4232.

"Autonomous Production Groups: Responsibility Shared", video, Britannica, Training and Development, 1488 South Lapeer Road, Lake Orion, MI 48305, (800) 554-6970, in MI call collect (313) 693-4232.

PRODUCTIVITY/productivity

APPENDIX F
TEACHER'S ADDENDUM TO INSTRUCTIONAL MODULE ON PRODUCTIVITY

DRAFT - For Field Testing Purposes Only

Project GENTEC
Generic Technical Competency

INSTRUCTOR'S ADDENDUM to

Instructional Module on

WORKER PRODUCTIVITY

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Developed in part with funding from the
Illinois State Board of Education's
Department of Adult, Vocational and Technical Education
Springfield, Illinois

1987
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Transparency Master

INTRODUCTION:

The purpose of this INSTRUCTOR'S ADDENDUM to the GENTEC instructional module on PRODUCTIVITY is to provide you, the instructor, with:

1. an overview, definition, rationale, and example of the generic technical competency being taught,
2. additional instructional activities which can be used in a classroom setting, and
3. additional instructional resources in order to enhance your instructional efforts.

The instructional module is intended to be self-contained. The average student should be able to complete the module and learn the competency without outside assistance. The competencies are presented in a logical, understandable, and concise form. Classroom instruction should involve:

*lecturettes,
*open discussion,
*identification of competencies and application to employment situations,
*additional instructional activities,
*and opportunities to ask questions.

However, to enhance the acquisition and retention of the information, your first step is to read and become familiar with the entire student-based instructional module. This INSTRUCTOR'S ADDENDUM is only a supplement to the module.

Second, review the intended learner outcomes of the module. This will help you focus your teaching on the most pertinent aspects of the competency.

Third, improve your understanding of the competency by reviewing several of the suggested resources/references. Copies of several significant resources have been appended to this addendum for your convenience.

Fourth, prepare a lesson plan on the competency. This should begin by helping students to generate a list of their key questions regarding the competency. You should find that a student-generated list of key questions will match the key questions used in the instructional module.

Fifth, assign the students to read and complete the instructional module.

Sixth, present the lesson. Masters for overhead transparencies have been appended. With some modules, audio and/or video tapes have been prepared to assist with your teaching. These are listed in the RESOURCES/REFERENCES section.

Finally, assess how well the students have mastered the GENTEC competency. This may be accomplished by administering the post-test, which is included in this module.

OVERVIEW OF GENTEC

In today's market of competitive hiring, the prospective employee with the best preparation will get and keep the job. But the best technical preparation is not always measured by occupational proficiency. Certain generic technical competencies are becoming increasingly important. Most vocational educators and occupational trainers will agree that program completers with knowledge, skills, and attitudes in generic technical competencies are better prepared to enter and progress within a desired occupation.

GENTEC is a broad-based "capstone" curriculum of generic technical competencies involving critical thinking, sophisticated behaviors, and professional attitudes. GENTEC is applicable to all occupational clusters of agricultural, business, health, home economics, and industrially-related occupations.

The purpose of GENTEC is to increase students' competence in areas of generic technical knowledge, skills and positive attitudes in order to enhance their competitive edge for job entry and advancement.

Many educators, realizing the importance of generic technical competencies have attempted to provide instruction by integrating time on each topic into an existing curriculum. The problem has been that an encompassing curriculum of generic technical knowledge, skills, and attitudes did not exist. In addition, succinct instructional materials on specific topics of generic technology did not exist in a readily available form for use in skill-level courses on the high school and community college levels (grades 11-14).

GENTEC may be used as a separate curriculum for a specific course or courses. Students in almost any technical major benefit from a course on critical thinking skills on a technical level.

Also, GENTEC may be incorporated into a larger skill-development curriculum at a logical point. The instructor may spend as much time or as little time as desired.

READABILITY

The Fog Index of Readability was taken at three random points within the module. The range was determined to be at the tenth-grade level.

GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Productivity

EXAMPLE:

A carpenter's assistant in a small woodworking shop was faced with an assignment. He was to construct in one hour a shallow, square box to hold a phonograph turntable by following the sketches made by his boss and the customer.

The assistant knew the mechanics of woodworking but was faced with the problem of having to build the project in no more than one hour. The price was based on the materials costing one third of the estimate, the worker's pay another third and the final third going back to the shop as profit. The assistant knew that if he took too long, the shop wouldn't make any money. If the assistant made a mistake and had to start over with new material, the shop would not make any money. He knew he had to do it right the first time within a reasonable amount of time. He knew he could produce, but wondered if he could be productive.

DEFINITION:

Human productivity is the amount that a person can produce. In economic terms, human productivity is the output (the quantity and quality of goods and services) in relation to people's input of effort and time, usually measured in hourly wages.

RATIONALE:

Why should a person be more productive? Why should someone even be concerned with being productive? Everyone uses a portion of their time to produce a good or service. Preparing a meal is "producing." Other examples are raising vegetables in a garden (a good), being a foster parent (a service), and teaching someone to tole paint (a service). Whether in economic (work) life or in personal life, one thing is true: YOU CAN ALWAYS BE MORE PRODUCTIVE.

We should be interested in improving productivity. Since most people don't want to work harder, they want to work "easier." Even though most of us want to work "easier," we still want to produce the same amount. It's not that we're lazy; we're just ingenious. We search for ways to do the same thing with less effort, in less time, with less trouble, with fewer resources. We want to produce as much yet produce it with fewer inputs. That's called "increasing your human productivity."

When we realize we have time, energy, and resources left over, we begin to increase the quantity and improve the quality of what we produce. And that increase in productivity produces personal rewards such as money, status, and positive feelings about ourselves and others.

INTENDED LEARNER OUTCOMES:

A learner who has mastered this concept will be able to:

1. Describe the importance of improving occupational productivity.

2. Utilize personal skills which can improve personal productivity.

3. Initiate and use these skills on their own and without external impetus.

4. Display positive attitudes toward personal productivity by taking responsibility, initiating action, and acknowledging rewards for increased human productivity.

RESOURCES/REFERENCES (listed in order from best to least best for instructional purposes):

Vough, Clair F. & Askell, Bernard. (1979). Productivity, A Practical Program for Improving Efficiency. New York: AMACOM.

McBeath, Maurice Gordon. (1974). Productivity Through People: A Practical Guide To Improvement. London: Business Books.

Staff. (1986, October). Cleanliness Is Next To Productivity. Pryor Report, p. 9.

"Making People Productive", ASTD Publishing Service, P.O. Box 4856, Hampden Station, Baltimore, MD 21211.

"Peak Performance", video, Nightingale-Conant Corporation, 7300 North Lehigh Avenue, Chicago, IL 60648-9951, (800) 323-5552.

"People And Productivity: We Learn From The Japanese", video, United Training Media, 6633 W. Howard Street, Niles, IL 60648, (800) 558-9015, in IL call collect (312) 647-0600.

"The Case For Productivity", video, United Training Media, 6633 W. Howard Street, Niles, IL 60648, (800) 558-9015.

The Productivity Sourcebook, Edited by Richard Beatty, John Bernardin and James Nickel. Order from: Human Resource Development Press, 22 Amherst Road, Ameherst, MA 01002, (413) 253-3488.

"Productivity of Japanese Industry", video, Britannica, Training and Development, 1488 South Lapeer Road, Lake Orion, MI 48305, (800) 554-6970, in MI call collect (313) 693-4232.

"High Productivity-How Matsushita Does It", video, Britannica, Training and Development, 1488 South Lapeer Road, Lake Orion, MI 48305, (800) 554-6970, in MI call collect (313) 693-4232.

Quinn and Staines. Quality of Employment Survey, Survey Research Center, University of Michigan, 1977.

Public Agenda Foundation. Pilot Study, 1982.

"Autonomous Working Groups: Smarter Together", video, Britannica, Training and Development, 1488 South Lapeer Road, Lake Orion, MI 48305, (800) 554-6970, in MI call collect (313) 693-4232.

"Autonomous Production Groups: Responsibility Shared", video, Britannica, Training and Development, 1488 South Lapeer Road, Lake Orion, MI 48305, (800) 554-6970, in MI call collect (313) 693-4232.

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*1986. For more information contact Dr. Richard K. Hofstrand, Ph.D. Eastern Ill. University, Charleston, IL 61920; 217-581-3912.

STUDENT EVALUATION INSTRUMENT
FOR
OCCUPATIONAL PRODUCTIVITY

TRUE/FALSE - Place a "T" for True if you feel the statement is true or "F" for False if you feel the statement is false.

1) _____ Productivity is anything that improves performance or lowers costs.

2) _____ As a worker, you need not be concerned about increasing the quantity of goods and services, only improving the quality of goods and services.

3) _____ An example of an internal reward is a feeling of satisfaction; a calm, "settled" feeling of having exerted considerable effort.

4) _____ To increase your productivity, it may help to sub-divide large efforts into achievable, sequential stages or steps.

5) _____ Employees do not gain a sense of control over the direction and growth of the organization in participatory management.

FILL IN THE BLANK - Write in the blank the word(s) you feel best finishes each statement.

6) ____________________________ are usually conducted to determine "the best way" to accomplish a production task.

7) The intent of the ____________________ is to garner suggestions as to how productivity could be increased through better methods, materials, machinery, money, or better management.

8) _________ are those things that are consumed such as food, clothing and shelter.

9) ___________________ are organized groups of employees whose objective is to solve production problems where they occur.

10) ______________ is the act of making, creating, or providing something.

SHORT ANSWER

11) List and give two examples of each of the six "M's" of inputs:

1.

2.

3.

4.

5.

12) To which three levels of productivity do workers contribute?
1.

2.

3.

13) Explain the following phrase: "Increasing your human productivity."

14) List 2 common external rewards for being productive as explained in the module:

1.

2.

15) List 2 common internal rewards for being productive as explained in the module:

ANSWER KEY TO
STUDENT EVALUATION INSTRUMENT FOR OCCUPATIONAL PRODUCTIVITY

TRUE/FALSE

1. True
2. False - A worker should be concerned about BOTH increasing the quantity of goods and services and improving the quality of goods and service.
3. True
4. True
5. False - A characteristic of participatory management is that employees do gain a sense of control over the direction and growth of the organization because they are given a voice in the process of management.

FILL IN THE BLANK

6. Time and motion studies
7. suggestion box
8. Goods
9. Quality circles
10. Production

SHORT ANSWER

11. The six "M's" of inputs:
    1. materials - nonconsumable materials (the wood, glue, screws, nails)
    2. machinery - saws, sanders, building, tool technology
    3. huMan - people power such as time, effort, capabilities
    4. methods - expertise, technique, craft
    5. management - advertising, directing staff, complying with government regulations, policies

12. *your own personal productivity
    *the productivity of the organization for which you work
    *the productivity of the nation

13. Producing as much as you currently are but with fewer inputs.

14. Student must choose any 2 of the following:
    money, job security, upward career mobility
    *or others as discussed in class

15. Student must choose any 2 of the following:
    feelings of satisfaction, feelings of achievement, feelings of competence
    *or others as discussed in class

APPENDIX G
INSTRUCTIONAL MODULE ON TECHNIAL JUDGMENT

DRAFT - For Field Testing Purposes Only

Project GENTEC
Generic Technical Competency

Instructional Module

on

TECHNICAL JUDGMENT

Prepared by:
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Developed in part with funding from the
Illinois State Board of Education's
Department of Adult, Vocational and Technical Education.

Making accurate technical judgments is a vital skill for success in a technical occupation. The purpose of this GENTEC module is to help you understand technical judgment in general and also in an occupational setting and to help you structure your thinking to make better judgments in your occupational setting quickly and efficiently.

When you complete this instructional module, you will be able to:

* Describe the concept of technical judgment.

* Describe the different types of judgments that an employed person may face in an occupational setting.

* Value the importance of structured thought in reaching wise judgments on the job.

* Recite the sequential steps in making a technical judgment.

* List three or more alternatives to a given situation which requires a judgment.

* Rank order choices from "best" to "worst" and justify your choices.

* Approach a situation which requires a technical judgment objectively and apply the steps in making a technical judgment.

* Define at least 80% of the terms commonly used when discussing technical judgments.

INTRODUCTION

How do you judge alternatives or options which are available to you?

Maybe you use a childhood rhyme.

Eenee,
Menee,
Minee,
Moe.

Or maybe you judge based on your gut feelings and preferences.

Or maybe you flip a coin: Heads you call your supervisor for help with your patient, tails you handle the situation on your own.

Or maybe you throw darts at a dart board which contains all of your available alternatives.

Or maybe you pick petals from a daisy.

Or maybe you judge by not deciding at all. Someone once said that "not to decide is to decide."

OCCUPATIONAL CAMEO

Carl J. describes a recent incident as a rookie police officer.

"I moved cautiously down the darkened alley in a semi-crouched position with my weapon clutched tightly in both of my hands. From out of the lighted doorway ahead, I could hear loud voices and a fracas. Suddenly, a man darted through the doorway, turned, saw me and reached in the pocket of his jacket. Should I pull the trigger?

I had been on the police force for only six months. Most calls had been routine: domestic disturbances, minor vehicle mishaps, lost pets and the occasional sleeping drunk. But this call was different. There was suspicion of a robbery in progress. The caller had complained of a disturbance. Who was involved? How many were there? Was there potential danger for others? For me? My heart was pounding. My palms were wet against the butt of my gun. My knees felt weak. And I was alone. My experienced partner was moving around to the other side of the block.

For a police officer, this judgment point is probably the most feared. Emotions run high. Judgments must be made quickly. A wrong judgment can result in an innocent victim getting shot or killed. Or being wounded or killed yourself.

Fortunately, at the Police Academy we had been trained for this type of situation. We had been prepared to judge whether the situation required us to shoot or not. We had been trained using simulation which involved mock-ups of warehouses or dark alleys. Other simulations used video tape or laser video disk simulations. Each trainee was provided with a pistol which fired a laser beam. The simulation was played out, and we were judged on two criteria: judgment and accuracy. The first judgment was to shoot or not. If we chose to shoot, the second criterion was the accuracy of the shot. If we shot, the accuracy was pinpointed almost instantaneously by computer simulation.

The simulation helped us to work through our emotions, to separate essential from nonessential data and to provide a frame of reference of options for choices. Given this frame of reference, the split-second judgment is easier and more accurate."

This module is designed to provide answers to the following key questions:

1. Why is technical judgment a vital skill?
2. What are the different styles of judgment?
3. What are the different types of judgments that you may face in a technical setting?
4. What are the sequential steps in making a technical judgment?
5. Why is it important to understand the sequential steps in making a wise technical judgment?
6. What are some possible problems you may face in making a technical judgment?
7. How do you determine if the judgment you made is a wise one?
8. How can skills obtained in technical judgment be applied to existing situations?
9. What are the terms commonly used when discussing technical judgments?

1. WHY IS TECHNICAL JUDGMENT A VITAL SKILL FOR EMPLOYEES AS WELL AS EMPLOYERS?

Carl J. found himself in a situation which required an immediate and accurate judgment. Fortunately, Carl was instructed in the judgment process at the police academy by learning a detailed and prescribed process.

He, like many others, make many technical judgments every day. Many involve life and death situations. These people include police officers, laboratory technicians, health care workers, and others whom we entrust with our lives, our health, our property, our safety, and our well being. A poorly made judgment could jeopardize a life or cause financial loss by needlessly damaging property.

Technical judgments can also affect our co-workers who depend on us to do our jobs correctly. The team effort is thwarted without that skill.

The long-range economic health of the employer is also dependent on the wisdom of the numerous judgments of the employees. Mistakes from inaccurate judgments can diminish public trust and confidence in the business or organization.

For example, executives at a company which manufactures a popular pain reliever recently had to make some very difficult judgments. One judgment was what to tell the public about the discovery of malicious cyanide poisoning in the capsules of the pain reliever which they manufactured. Ultimately, they decided to pull all of the pain reliever in capsule form from the shelves across the country, at a great financial loss to the company. Their judgment displayed their concern for their customers' well-being. The incident could have resulted in the public's loss of faith and trust and could have eventually caused financial ruin for the company. Instead, public confidence was restored and the company's sales picked up soon after.

INSTRUCTIONAL EXERCISE #1:

Study the occupational cameo of Carl J. In your opinion, why is it important that Carl know how to make judgments quickly and correctly? Write your reasons below:

1.

2.

3.

2. WHAT ARE THE DIFFERENT STYLES OF TECHNICAL JUDGMENT?

People tend to have different styles or approaches when making technical judgments. Some styles can be effective; others are detrimental. The following are common styles. Which do you tend to use?

IMPULSIVE. Likes to make snap judgments. Judgments made with little thought or examination. Often takes the first alternative. Tends to believe that "S/he who hesitates is lost."

INTUITIVE. Makes judgments by deciding what "feels" right. Chooses a mystical, preconscious choice. Bases judgments on "inner harmony."

FATALISTIC. Believes in fate. Tends to let the environment decide. Believes that, "It's all in the cards."

COMPLIANT. Tends to want others to make the final judgment. Is comfortable following someone else's plans. "Anything you say, Sir."

DELAYED. Excessive procrastination. Takes a moratorium. Postpones both thought and action too long. "I'll cross that bridge later."

AGONIZED. Frets and worries about making any final judgments. Gets lost in the information and data. Becomes overwhelmed with analyzing alternatives. "I don't know what to do."

PARALYTIC. An advanced form of AGONIZED. Accepts responsibility but is unable to approach it. "I can't face up to it."

PLANNED. Uses a rational approach and procedures so that the end result is satisfying. A balance between thinking and feeling. "Weighs the facts and the alternatives."[1]

When making technical judgments, the PLANNED style is preferred. Please realize that the PLANNED styles involves a certain degree of the INTUITIVE style. It uses the cognitive aspects of the PLANNED style and the emotional aspects of the INTUITIVE style. This combination produces judgments which are the wisest given the available choices and supporting data.

INSTRUCTIONAL ACTIVITY #2:

Nancy K. is a secretary in the purchasing division of a small manufacturing business. She has noticed that the filing system in the office is beginning to fail. Listed below are some of her thoughts regarding the situation. From the list of judgment styles, select which style is being described. Place your answer in the blank. (You will use each judgment style only once.)

JUDGMENT STYLES:

IMPULSIVE
FATALISTIC
DELAYED
PARALYTIC

INTUITIVE
COMPLIANT
AGONIZED
PLANNED

1. The system is failing our business, but I'm not in any hurry to remedy the situation. I'll wait until it's really bad and then decide. ____________________

2. I've had it! It's Monday morning and the last thing I want to see is that filing cabinet with its bulging file drawers. I'm ordering five new filing cabinets and hiring two filing clerks to manage the new system today. ____________________

3. The system needs updating. I'll read up on the new filing systems in brochures, flyers, and catalogs. Then I'll talk to the office design specialist and obtain his opinion. When I feel like I have thoroughly investigated the situation, I'll make a judgment based on a rational comparison of the available equipment.

____

4. I know the filing system is bad and getting worse, but why worry about it? Things always work out for the best, don't they? I'll just let the chips fall where they may. ____________________

5. I've researched the issue thoroughly and found two great filing systems that I think would work for our office. The more expensive would probably be best, in my opinion. It's more adaptable to changes in volume and is very well organized. The other system is less expensive, isn't well organized, and would not be adaptable to changes in volume. I presented the case to my supervisor. She immediately said that we would purchase the less expensive system. The budget has to be carefully watched. I felt otherwise, but didn't argue with her. It's really not important. We'll cope.

____

6. After a thorough research process, I have narrowed my choices down to two systems. I was hoping that one system would turn out clearly to be the winner, but no such luck. Both are very comparable in function and price. Should I choose system A, the less expensive system? That would fit into our budget better. However, something keeps telling me to choose system B. I can't pinpoint the exact reasons; it's just a gut feeling.

____

7. What do I do now? I have brochures from fifty companies which manufacture filing systems. But after studying the brochures and comparing them to my check list, I'm still not any closer to making a final judgment. I'm getting worried. I don't think that I'll ever be able to do it.

____

8. I realize that we need a new filing system and since that falls in my job, I need to pursue the issue. But I don't want to choose the wrong one. Filing systems cost a lot of money. I don't want to waste the company's money. I can't face that.

____

3. WHAT ARE THE DIFFERENT TYPES OF TECHNICAL JUDGMENTS THAT AN EMPLOYED PERSON MAY FACE IN AN OCCUPATIONAL SETTING?

Technical judgments may be classified into five types. They are:

1. Impulsive
2. Routine
3. Intuitive
4. Pre-determined
5. Rational

The differences between each type depends on:
-the way each judgment is made, and
-the conditions or context surrounding the situation.

The first type of judgment is categorized as impulsive. This is a judgment which is made without careful consideration and is often called a "snap" judgment. An example of an impulsive judgment is immediately refusing to invest with friends in a business venture because you feel it is too risky, without really giving the idea any thought.

The second and most common type of judgment in technical situations is categorized as routine. These are judgments which deal with familiar situations. Personal habits, customs, or rules determine a routine judgment. Whether to clean equipment in your occupational setting, regardless if it was used during the day or not, is an example of a routine judgment.

A third type of judgment is an intuitive judgment. These are judgments that are made because "it feels right." Such judgments may not be based on careful consideration of the existing situation and available strategies. An example of an intuitive judgment is choosing a line of clothing to sell in your boutique, not because it is a dependable brand, but because something tells you that women will "just love" it.

A fourth type of judgment is classified as pre-determined. In this type, the criteria or reasons for choosing a particular alternative are selected before knowing the actual choices themselves. An example of this type of judgment is deciding that the lowest bidder will get the job. A judgment which is based on moral or ethical principles is also a pre-determined judgment.

A fifth type of judgment is rational. These are judgments that are made after giving careful consideration to the situation using a structured thought process. If you give close attention to the alternative courses of action and the likely consequences of each, then you have made a rational judgment. An example of this type of judgment is: As the manager of a fast food restaurant, you carefully evaluate market trends in similar geographical areas. After a thoughtful analysis of the population, you establish that the conditions and outlook are favorable for the addition of a seafood salad. You feel that adding the seafood salad to your menu would be a rational thing to do.

INSTRUCTIONAL ACTIVITY #3:

Consider the following examples of judgments from Column A and indicate which type(s) of judgment(s) has been made in each case from Column B:

Column A

_____Selecting the brown item because, all things considered, it was the best quality item, cost the least money, will give long service, won't go out of style, and may never wear out.

_____Buying a blue item because you wanted something that would match the color of your eyes.

_____Buying something that you didn't intend to buy when you entered the store.

_____Buying a black item because you always buy black.

_____Choosing a red item from several alternatives because it felt like the best choice.

Column B

A. Impulsive
B. Routine
C. Intuitive
D. Pre-Determined
E. Rational

OCCUPATIONAL CAMEO

Jerry S. is a self-employed painting and wall papering estimator. He tells how he got started in this type of business.

"They always ask, `How much is your bid on this job?

I hear the question frequently. In fact, that is the reason I am there--to give a bid. I have been a free-lance bidder now for about three years.

To give a bid, I have to quote a dollar figure. That dollar figure is hard to estimate. Many questions have to be answered. How many hours will it take? What happens if extra preparations need to be made like scraping and sanding that can take a whole day?

How much for materials? I've seen new woods soak up stain like you wouldn't believe. And when you're paying $20 and $30 a gallon, underestimating can add up quickly.

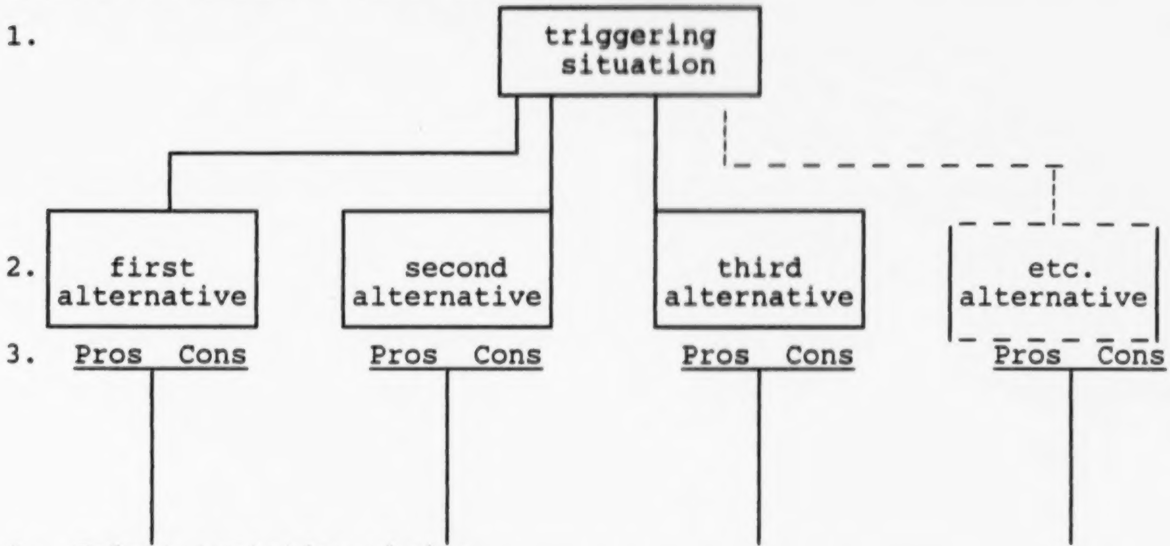
What will the competition bid? Bid too high, and someone else with a lower bid might get the job. Bid too low, and we could end up losing money.

I'm there to give a bid. I have to size up the whole job. How long will it take? How much material will the job use? What are the possible unforeseen complications? What will the competition bid? I have many criteria to judge, and each could alter the final bid."

---

4. WHAT ARE THE SEQUENTIAL STEPS IN MAKING A RATIONAL JUDGMENT?

To make a wise technical judgment, you must have effective procedures for evaluating relevant knowledge and data. By mastering the following sequential steps, you will increase your chances of making a wise technical judgment.



4. Select tentative choice.
5. Test tentative choice against intuition and reality.
6. At the appropriate moment, select final choice.

1. DEFINE AND CLARIFY THE TRIGGERING SITUATION. In Jerry's situation, the triggering situation is that he is being called upon to give a bid for a particular job. He knows that he has to make an accurate bid, because he cannot go back on his word and change his price once he makes a quote. Without a definite judgment method, he is more likely to over-bid and possibly lose a job. Or he can also very easily under-bid and lose money on the job himself.

2. IDENTIFY ALTERNATIVE CHOICES. Generate as many alternatives as possible. At least three alternatives are ideal, but most people, unfortunately, only think of two.

3. LIST THE POSSIBLE PROS (POSITIVE) AND CONS (NEGATIVE) OF EACH ALTERNATIVE. For example, an alternative may give immediate results (pro) but be very costly (con). Search for information as long as time permits.

4. SELECT A TENTATIVE CHOICE.

5. TEST THAT CHOICE. How does it feel? What are the reactions of other people? This is also the time to add additional alternatives that may have been missed the first time through. Also, list the pros and cons of each new alternative.

6. MAKE YOUR FINAL JUDGMENT.

JUDGMENT MATRIX

If you have many alternatives to choose from, you may wish to use a judgment matrix. A judgment matrix is a tool to help you choose one alternative from many. To use a judgment matrix, perform the following simple steps:

1. List all available alternatives on the blank lines down the left side of the matrix. These alternatives do not have to be in any specific order.
2. Compare alternative #1 with alternative #2.
3. Circle (on line 1) which of the two you most prefer.
4. Staying on line 1, compare alternative #1 with alternative #3. Circle which of these two you most prefer.
5. Continue this process until you have compared alternative #1 with all of the other alternatives.
6. Compare alternative #2 with alternative #3. Circle (on line 2) which of those two you most prefer. Continue to compare alternative #2 with all of the alternatives listed, circling the alternative you prefer each time.
7. After you have compared each alternative with all others, count the number of times you chose each alternative.
8. In the column at the far left of the matrix, write the number of times you circled that alternative. The alternative with the highest number indicates the highest priority. The alternative with the lowest number indicates the lowest priority. List your alternatives in priority order from highest to lowest. This is your rank order.

In the event of a tie between two (or more) alternatives, compare those alternatives which tied each other.

Anna, a chef at a restaurant, needs to judge which appetizer would be best to add to her menu. She has ten alternatives, which are listed on the following judgment matrix. However, she may add only one appetizer.

Anna has set some criteria that the chosen appetizer must meet in order to be placed on the menu. They are:

- -It must be prepared quickly.
- -It must be economical.
- -It should be unique to the geographic area.

Examine the judgment matrix closely below which lists Anna's alternatives and how she ranked them. (NOTE TO TECHNICAL DESIGNER: The stars indicate her choices. PLEASE CIRCLE THE NUMBERS WHICH HAVE STARS BESIDE THEM.)

JUDGMENT MATRIX
for
ANNA'S NEW APPETIZER

5	#1 egg rolls	*1 2	1 3*	1* 4	1* 5	1 6*	1* 7	1 8*	1* 9	1 10*
4	#2 potato skins		2 3*	2 4*	2* 5	2* 6	2* 7	2 8*	2* 9	2 10*
7	#3 fried mozzarella			3* 4	3* 5	3 6*	3* 7	3* 8	3* 9	3 10*
3	#4 onion rings				4 5*	4* 6	4 7*	4 8*	4* 9	4 10*
3	#5 deep-fried mushrooms					5 6*	5 7*	5* 8	5* 9	5 10*
6	#6 deep-fried ravioli						6* 7	6* 8	6* 9	6 10*
3	#7 deep-fried zucchini							7 8*	7* 9	7 10*
5	#8 nachos with cheese								8* 9	8 10*
0	#9 shrimp cocktail									9 10*
9	#10 cheese puffs									

After progressing through the steps of the comparing each alternative to each other, cheese puffs was the apparent winner by being chosen nine times.

Anna explains her rationale for choosing cheese puffs:

"All of the appetizers that I listed were good choices; some are just better than others. Egg rolls are easy to prepare, but they are expensive because of the dips that must be served with them. Potato skins are very time consuming to prepare and cook; fried mozzarella cheese is popular, but is very difficult to keep fresh.

Onion rings are another appetizer that have a long prep time compared to deep-fried ravioli. But I couldn't find a dependable ravioli vendor. Deep-fried zucchini are too plentiful in gardens in the summer. Therefore, people usually don't want to eat zucchini in a restaurant.

Nachos are economical, but it takes too long to prepare them. Shrimp cocktail is out of the question because I found that it was much too expensive. My supplier can get great shrimp for me, but I just don't think people would be willing to pay the price for them.

Cheese puffs meet all of my set criteria: they are quickly prepared, economical, and unique to this area. After I introduce them on my menu, if my customers don't like them, I will take a look at my second choice. According to my grid, my second choice resulted in a tie between fried mozzarella and deep-fried ravioli. I will have to compare the two and see which is best.

The judgment matrix is very helpful to me. It helps me to organize my thoughts, and to systematically compare all of my available alternatives. And it's easy to use, too."

INSTRUCTIONAL ACTIVITY #3:

Use the judgment matrix to compare the restaurants that you frequent.

JUDGMENT MATRIX

____ #1 $\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{5}$ $\frac{1}{6}$ $\frac{1}{7}$ $\frac{1}{8}$ $\frac{1}{9}$ $\frac{1}{10}$

____ #2 $\frac{2}{3}$ $\frac{2}{4}$ $\frac{2}{5}$ $\frac{2}{6}$ $\frac{2}{7}$ $\frac{2}{8}$ $\frac{2}{9}$ $\frac{2}{10}$

____ #3 $\frac{3}{4}$ $\frac{3}{5}$ $\frac{3}{6}$ $\frac{3}{7}$ $\frac{3}{8}$ $\frac{3}{9}$ $\frac{3}{10}$

____ #4 $\frac{4}{5}$ $\frac{4}{6}$ $\frac{4}{7}$ $\frac{4}{8}$ $\frac{4}{9}$ $\frac{4}{10}$

____ #5 $\frac{5}{6}$ $\frac{5}{7}$ $\frac{5}{8}$ $\frac{5}{9}$ $\frac{5}{10}$

____ #6 $\frac{6}{7}$ $\frac{6}{8}$ $\frac{6}{9}$ $\frac{6}{10}$

____ #7 $\frac{7}{8}$ $\frac{7}{9}$ $\frac{7}{10}$

____ #8 $\frac{8}{9}$ $\frac{8}{10}$

____ #9 $\frac{9}{10}$

____ #10

ODD CHOICE OUT

Another tool to help you select your alternatives is to utilize a technique called "odd choice out." This is an adaptation of what we in childhood called "odd man out." With this technique, alternatives are eliminated with the least desirable alternative eliminated first, next the second, etc. until only one alternative, "the least of the evils," remains. It may be easier for you to decide what you don't like, rather than what you do like. You can select preferences in reverse order: rank choices by beginning with the one least liked or desired.

INSTRUCTIONAL ACTIVITY #4:

You find yourself in a triggering situation in which several employees are to be laid off, including yourself. The employer offers alternative choices. Select your choice using the odd choice out technique.

A. Laid off in one month.

B. Laid off immediately with one month's severance pay.

C. Work half time for two months and then get laid off with employee-sponsored assistance in finding another job.

D. Be retrained at employer expense and stay on in a lesser-paying job.

E. Relocate to another state and continue to work with your same employer.

F. Be retrained at employer expense and move to another department, working third shift.

G. Be moved to third shift, but do the same job as before.

OCCUPATIONAL CAMEO

Deborah L. is a medical laboratory technician. She talks about one of her experiences in making judgments on the job.

"You can imagine my surprise I was handed a subpoena. It was about 2:00 in the afternoon, and the hospital was unusually quiet. For some reason we hadn't yet received our quota of "weekend traumas," which usually start by mid-afternoon every Sunday.

The summons was for me to appear in court to explain how I had performed a particularly sensitive laboratory procedure. What they really wanted to know was how I had decided to do another test on a blood sample that had come in for typing. Blood typing is a routine laboratory procedure, but for some reason this sample looked thinner in consistency than most other samples. I ran a few other tests only to find that the sample appeared to have been diluted with something, probably just sterile water. But why had it been watered down? That's obviously what the court wanted to know also. I'd told my supervisor about my findings--the blood type, as well as my suspicion of someone tampering with the sample.

I wasn't concerned about what lab tests I had performed and what I had found. The court, however, appeared to be interested in how I had made my judgment. Had I made it on a whim, or had I really known what I was doing?

Luckily, I had learned some sequential steps in making judgment calls when I was attending technical school to learn how to be a lab technician. When I got on the stand, I told about how I had followed a step-by-step sequence in making that judgment. They seemed impressed...especially the judge. I think she really understood. She has to make tough judgments all the time."

----

5. WHY IS IT IMPORTANT TO UNDERSTAND THE SEQUENTIAL STEPS IN MAKING WISE TECHNICAL JUDGMENTS?

Deborah L. did not know when she made her final judgment with the blood sample that she would have to justify her judgment to a judge. But because she used a prescribed and sequential procedure in her judgment process, the courts were impressed and satisfied that a competent and skilled employee had performed the procedure.

When used correctly, a sequential process of making technical judgments will increase your influence and credibility. It will also help you account for your judgments when called upon, as in the case of Deborah L.

OCCUPATIONAL CAMEO

Floyd K. is a cattle buyer for a large slaughter house. He talks about his job.

"How do I do this job? I've been buying cattle for over 30 years now. If I do it right, the company pays me. If I do it wrong, they fire me. If I make money for the company, they'll keep me on. If I make some bad judgments and lose money, I'm gone, 'cause there's always someone behind me ready to take my job.

The job really comes down to two judgments: do you want the critter, and, if so, how much are you willing to pay? The company has a standing order for so many critters a day. My job is to find that many at the best possible price. I have to know what's happening in the futures market, the hog market, and other markets. All those things can affect the price just a few cents a pound.

I used to buy critters one at a time. I would decide if I wanted it and then quote a price. Sometimes I'd get it. Sometimes I'd have to raise my price. Sometimes I'd figure the animal wasn't worth it and go on to the next one. Now I buy by the lot. A cattle feeder will come in with maybe 20 or 30 feeder steers. If the penful looks consistent, I'll quote a price on the lot.

My criteria for making these judgments? Things have changed. Years back, consumers wanted cuts of meat with a lot of marbling. I'd buy stocky little steers that were built low to the ground, square, deep in the twist, with full and deep shanks. I'd watch for the purebred lines: Angus, Hereford, Charlois. We didn't see much cross-breeding then.

Now it's a different story. People are more health conscious. They don't want as much fat in their meat. The Texas longhorn has now returned to popularity. Now when I see the longer face and the longer legs of the longhorn cross, I'll buy it. Less fat. Less marbling. Leaner meat. More sales."

6. WHAT ARE SOME POSSIBLE PROBLEMS AN EMPLOYED PERSON MAY FACE IN MAKING JUDGMENTS IN AN OCCUPATIONAL SETTING?

There are several problems when making job-related judgments. The first is to realize the difference between rational and wishful thinking. Often we wish something would happen and may make judgments toward that option, rather than being realistic and making the judgment in a rational manner. Rational thinking involves utilizing accurate information, realistic data, reasoning and understanding after giving careful consideration to all pertinent factors.

A second possible problem involved when making judgments is when the employer believes that employees should not make judgments. Many employers naively believe that employees should "just work" and "not think." The reality, however, is that employees make hundreds of work-related judgments every day. If you find yourself in this situation, explain to your employer your process of making technical judgments. Once you've shown your competence to make judgments, your employer may be more receptive to accepting them.

OCCUPATIONAL CAMEO

Carol G. is a secretary for a chief executive officer in a large firm. She talks about making judgments on her job.

"I like my job here. My work load isn't too heavy. My boss is easy to work with, and she trusts my judgment on many things. This is a pretty good job--probably the best I've ever had.

I try to make my boss's job easier because she has so many responsibilities to attend to each day. I make it easier for her, and she in turn rewards me. The rewards aren't always money. Sometimes she lets me take a longer lunch hour or lets me go home a half hour early. I, personally, feel good when I know that I've saved her some time. It's worth the extra effort on my part.

Take last week, for example. Our office really needed a commercial word processing package. I found myself typing the same formats in reports and letters time and time again. I knew that a word processing package would make my life a lot easier and in turn, I could serve my boss more efficiently. A word processing package, computer and all peripherals are costly, though. I wanted to make the right choice for our office.

I know how to make judgments. I do it all of the time in my job. This situation was no different to me, and I wasn't afraid to attack it. The triggering situation? Finally getting fed up with typing the same formats over and over again, that a word processor could help me finish a report in half the time it takes me now. Alternative choices and pros and cons of each word processing package that were recommended to me? Multi-Advantage--easy to learn, but expensive. Just Perfect--inexpensive, but not very efficient. Word Mate--most expensive, but also most versatile. Next, I selected Word Mate as a tentative choice and checked the references of others who have already purchased it and have it implemented. After glowing reviews from several offices, we purchased Word Mate.

This was a major purchase for our office. I wanted to make the right judgment when I recommended the best package for our office. Having an organized, sequential plan for making my final judgment was essential.

7. HOW DO YOU DETERMINE IF THE JUDGMENT YOU MADE IS A WISE ONE?

Only by looking back at your judgment at a later date will you be able to evaluate its wisdom. But if you've followed the sequential steps for making a technical judgment, you can feel reasonably comfortable that you made a rational one. If you can answer "YES" to all of the following questions, it is a wise judgment:

1. Did you know all of the facts of the problem situation? YES NO

2. Were all of the alternatives considered? YES NO

3. Were the probable benefits and consequences of each alternative accurate and realistic? YES NO

4. Was a tentative judgment selected and tested? YES NO

OCCUPATIONAL CAMEO

Patrick B. is the head chef for a sidewalk cafe in San Francisco.

"I was hired a month ago to turn this place around. In better times, it was one of the most popular eating places within miles. The menu was intentionally small in order to cut costs, but people didn't care. For some reason, though, revenues dropped drastically. Now, the owners are barely breaking even.

I'm going to have to make a few crucial judgments. They are important ones because they can either make or break the cafe. It goes without saying that they can also either make or break my career. If I do well, the owners win, and I win by gaining valuable experience. If I don't do well, the owners have lost valuable time and money, and I lose my job.

One judgment I will make is to decide what items, if any, should be kept on the menu. I am far from my judgment point at this stage. There are lots of questions to be answered first. Do people want the same as before? If that's the case, I will need to learn why they stopped coming and remedy the situation. If I decide that they want a different menu, then I'll begin creating the different entrees.

Choosing new entrees can be difficult. I have to keep every single ingredient in mind. I want dishes that use basically the same ingredients as other dishes and complement each other. I will try to have at least two dishes that use mushrooms, for example. I don't want to have to buy mushrooms for just one dish. They are very perishable, and I could lose a lot of money if I have to throw the unused ones out every day.

Also, I have to choose dishes that use ingredients that are readily available in my area. In my last job, I was in charge of choosing a new dish. I made the mistake of choosing one that used kiwi fruit. What a mistake! The closest supplier was over two hours away and couldn't guarantee shipments when I needed them.

This job will be a real challenge. I am going to have to do a lot of careful research and then weigh and consider my judgment strategies. There's a lot riding on my choices."

8. HOW CAN TECHNICAL JUDGMENT SKILLS BE APPLIED TO EXISTING SITUATIONS?

Throughout this module are cameos of people describing how they make technical judgments in their jobs. These include the following: a rookie police officer, a medical laboratory technician, a self-employed estimator, a cattle buyer, a secretary, a chef, and a landscaper.

Although the people are fictitious, their jobs are real and they do show how technical judgment skills are applied in various existing situations.

OCCUPATIONAL CAMEO

Stuart E. is a commercial landscaper for a company in a large metropolitan area.

"I work for a company that landscapes only commercial buildings: doctors' offices, real estate offices, restaurants, and other places like that. We bid on each job. When we win a bid, we sit down with the owners and discuss the details. Most of the time, though, the owners will just let us make all the judgments. They don't want to bother with deciding whether to plant fat or skinny bushes or deciding where to place a berm. That's up to me, the landscape designer.

My judgment strategy depends on many factors with each job. Each job is very different. First I consider the soil composition and the climate in that particular area and choose the types of plants that would survive those conditions. Next, I decide what techniques would fit in with the rest of the terrain and surrounding buildings. After those major judgments are made, it is pretty easy. I learned in junior college what types of plants work in specific kinds of soils and climates and then just use my imagination.

A lot of people I deal with don't like to make judgments concerning the landscape around their buildings. But I enjoy making judgments. It's really not that difficult."

---

9. WHAT ARE THE TERMS COMMONLY USED WHEN DISCUSSING TECHNICAL JUDGMENTS?

Judgment grid: a form to make it easier to choose the best alternative. It lists all alternatives to a situation which requires a judgment and systematically compares each, one to another.

Judgment point: the moment in time at which the triggering situation has been carefully evaluated, available alternatives have been identified and clarified, and the person is ready to make a final judgment for the best alternative.

Judgment strategy: a plan of action chosen for the situation requiring a judgment.

Impulsive judgment: a judgment made without careful consideration; a "snap" judgment.

Intuitive judgment: a judgment based on "gut feeling."

Positive thinking: thinking based on confident feelings and desires.

Pre-determined judgment: a choice based on one or more criteria which were selected prior to the actual judgment point, e.g., choosing the "lowest bidder" (least expensive in dollars) which is decided before the bids or bidders are known.

Tentative judgments: a trial choice selected to "test out" or try that particular alternative.

Rational thinking: careful consideration of all pertinent factors--accurate information, realistic data, reason and understanding.

Routine judgment: a choice made about familiar situations in accordance with habits, customs, or rules.

Triggering situation: an event or set of circumstances which are not ideal and which could be remedied with a judgment.

Wise (or sound) judgment: a choice which history or hindsight confirms to have been the wisest and best.

Wishful thinking: judgments based on what a worker wants or desires to be true; is often irrational.

REFERENCES

[1] Decision-Making Training Module, Career Education Program, Scioto-Darby City Schools, Hilliard, Ohio, Susan J. Sears, Career Education Director

For additional information on TECHNICAL JUDGMENT, please refer to one or more of the following:

Arnold, John D. (1978). Make Up Your Mind! The Seven Building Blocks to Better Decisions. New York: AMACOM.

Fulcher, Gordon S. (1965). Common Sense Decision-Making. Evanston: Northwestern University Press.

Decision Making: Alternatives and Information", Barr Films, Box 5667, 3490 E. Foothill Boulevard, Pasadena, CA 91107

"Decision Making: Outcomes and Action", Barr Films, Box 5667, 3490 E. Foothill Boulevard, Pasadena, CA 91107.

APPENDIX H
TEACHER'S ADDENDUM TO INSTRUCTIONAL MODULE ON TECHNICAL JUDGMENT

Project GENTEC
Generic Technical Competency

INSTRUCTOR'S ADDENDUM to Instructional Module on TECHNICAL JUDGMENT

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1986
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Developed in part with funding from the
Illinois State Board of Education's
Department of Adult, Vocational and Technical Education.
Springfield, Illinois

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INTRODUCTION:

The purpose of this INSTRUCTOR'S ADDENDUM to the GENTEC instructional module on TECHNICAL JUDGMENT is to provide you, the instructor, with:

1. an overview, definition, rationale, and example of the generic technical competency being taught,
2. additional instructional activities which can be used in a classroom setting, and
3. additional instructional resources in order to enhance your instructional efforts.

The instructional module is intended to be self-contained. The average student should be able to complete the module and learn the competency without outside assistance. The competencies are presented in a logical, understandable, and concise form. Classroom instruction should involve:

*lecturettes,
*open discussion,
*identification of competencies and application to employment situations,
*additional instructional activities
*and opportunities to ask questions.

However, to enhance the acquisition and retention of the information, your first step is to read and become familiar with the entire student-based instructional module. This INSTRUCTOR'S ADDENDUM is only a supplement to the module.

Second, review the intended learner outcomes of the module. This will help you focus your teaching on the most pertinent aspects of the competency.

Third, improve your understanding of the competency by reviewing several of the suggested resources/references. Copies of several significant resources have been appended to this addendum for your convenience.

Fourth, prepare a lesson plan on the competency. This should begin by helping students to generate a list of their key questions regarding the competency. You should find that a student-generated list of key questions will match the key questions used in the instructional module.

Fifth, assign the students to read and complete the instructional module.

Sixth, present the lesson. Masters for overhead transparencies have been appended. With some modules, audio and/or video tapes have been prepared to assist with your teaching. These are listed in the RESOURCES/REFERENCES section.

Finally, assess how well the students have mastered the GENTEC competency. This may be accomplished by administering the post-test, which is included in this module.

OVERVIEW OF GENTEC

In today's market of competitive hiring, the prospective employee with the best preparation will get and keep the job. But the best technical preparation is not always measured by occupational proficiency. Certain generic technical competencies are becoming increasingly important. Most vocational educators and occupational trainers will agree that program completers with knowledge, skills, and attitudes in generic technical competencies are better prepared to enter and progress within a desired occupation.

GENTEC is a broad-based "capstone" curriculum of generic technical competencies involving critical thinking, sophisticated behaviors, and professional attitudes. GENTEC is applicable to all occupational clusters of agricultural, business, health, home economics, and industrially-related occupations.

The purpose of GENTEC is to increase students' competence in areas of generic technical knowledge, skills, and positive attitudes in order to enhance their competitive edge for job entry and advancement.

Many educators, realizing the importance of generic technical competencies, have attempted to provide instruction by integrating time on each topic into an existing curriculum. The problem has been that an encompassing curriculum of generic technical knowledge, skills, and attitudes did not exist. In addition, succinct instructional materials on specific topics of generic technology did not exist in a readily available form for use in skill-level courses on the high school and community college levels (grades 11-14).

GENTEC may be used as a separate curriculum for a specific course or courses. Students in almost any technical major benefit from a course on critical thinking skills on a technical level.

Also, GENTEC may be incorporated into a larger skill-development curriculum at a logical point. The instructor may spend as much time or as little time as desired.

READABILITY

The Fog Index of Readability was taken at three random points within the module. The range was determined to be at the tenth-grade level.

GENTEC: GENERIC TECHNICAL COMPETENCY*

COMPETENCY: Technical Judgment

EXAMPLE:

"My job is to train health care workers. This includes health care technicians as well as nurses aides. The students who have finished my program usually go to work in entry level technical jobs in hospitals and nursing homes. I tell them that they are the `eyes and ears' of the patient. They get to know each patient well; their pains, their families, their worries and problems. They work with the patient through the ups and downs.

My toughest training task is to train my students when to alert a higher level for medical help. Because my students get to know the patients so well, they often see medical signs even before the patient realizes them; change in skin color, change in eye clarity, a new pain in a critical area. The nursing professionals do not want to be called for every minor development. The medical technician, therefore, must learn to decide when to alert others. That is, they must make a decision as to whether to report these new medical observations. My toughest task is to train them on how to make those occupational descisions, those `judgment calls' if you please." (White, 1986)

DEFINITION:

Technical judgment is the selection of a best alternative from a variety of courses of action to reach desired objective(s).

RATIONALE:

Learning to choose between two or more possibilities often presents a problem for some people. Technical judgment involves personal thought, obtaining and evaluating input from other sources and progressing through a series of sequential steps to reach a sound judgment.

INTENDED LEARNER OUTCOME:

A learner who has mastered this competency will be able to:

1. Describe the concept of and appreciate the need for technical judgment.

2. Identify the different styles of making judgments.

3. Recognize the different types of judgments that an employed person may face in an occupational setting.

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*1986. For more information contact Dr. Richard K. Hofstrand,Ph.D. Eastern Ill. University, Charleston, IL 61920; 217-581-3912.

4. Value the importance of structured thought in reaching wise judgments on the job.

5. Recite the sequential steps in making a technical judgment.

6. List three or more alternatives to a given situation which requires a judgment.

7. Rank order choices from "best" to "worst" and justify your choices.

8. Approach a situation which requires a technical judgment objectively and apply the concepts of technical judgment.

9. Define at least 80% of the terms commonly used when discussing the concept of Technical Judgment.

RESOURCES/REFERENCES (listed in order from best to least best for instructional purposes):

Pfeiffer, J. William and Goodstein, Leonard D., Editors. (1983). The Annual for Facilitators, Trainers and Consultants. San Diego: University Associates, Inc.

Burton, Leon H. & Woltag, Susan N. (1986). Pathways: Guidance Activities for Young Children. Menlo Park: Addison-Wesley.

Brim, Orville Gilbert. (1984). Personality and Decision Processes; Studies in the Social Psychology of Thinking. Stanford: Stanford University Press

Bonini, Charles P. (1983). Simulation of Information and Decision Systems in the Firm. Englewood Cliffs: Prentice Hall.

Arnold, John D. (1978). Make Up Your Mind: The Seven Building Blocks to Better Decisions. New York: AMACOM.

Fisher, Aubrey B. (1974). Small Group Decision Making: Communication and the Group Process. New York: McGraw Hill.

Cassel, Russell Napolean. (1973). The Psychology of Decision Making. North Quincy: Christopher Publishing House.

Collins, Barry E. & Guetzkow, Howard. (1964). A Social Psychology of Group Processes for Decision Making. New York: Wiley.

Staff. (1986, October). Part and Whole, Pryor Report, p. 12.

White, M. Interviewed by R. K. Hofstrand at Sarah Bush Lincoln Medical Center in Mattoon, Illinois in September, 1986.

"Decision Making: Alternatives and Information," video, Barr Films, Box 5667, 3490 E. Foothill Boulevard, Pasadena, CA 91107.

"Decision Making: Outcomes and Action," video, Barr Films, Box 5667, 3490 E. Foothill Boulevard, Pasadena, CA 91107.

"Group Decision Making," Role Play/Simulations game, Management Research Systems Publications, 2320 S. Third St. Ste. #7, Jacksonville Beach, FL 32250.

"Effective Supervisory Leadership II (ESL)," Management Research Systems Publications, 2320 S. Third St., Ste. #7, Jacksonville Beach, FL 32250, (904) 241-1721/241-1722.

"A Time To Decide, The Ethics of Life/Death Decision Making," video, United Training Media, P.O. Box 718, 6633 West Howard Street, Niles, IL 60648-9990, (800) 558-9015 in IL (312) 647-0600.

Making Decisions: You Can Learn How," filmstrip and cassettes, Sunburst Communications Room M838, 39 Washington Avenue, Pleasantville, NY 10570-9971, (800) 431-1934, from New York (800) 221-5912.

How To Make Good Decisions, Part III--Group Decision-Making," filmstrips and cassettes, Sunburst Communications Room M838, 39 Washington Avenue, Pleasantville, NY 10570-9971, (800) 431-1934 from New York (800) 221-5912.

"Decision Making," a two-day skill development module, Development Dimensions International, Development Dimensions Plaza, 1225 Washington Pike, Box 13379, Pittsburgh, PA 15243-0379, (412) 257-0600.

SUGGESTED INSTRUCTIONAL ACTIVITIES

1. Prior to discussing the typical styles of making judgments, ask the class to discuss the following questions:
    *Do you make most of your own judgments?
    *Do you let others make judgments for you?
    *Do you take responsibility for your judgments?
    *How do you make judgments?

2. Ask students to comment, discuss, explore the following statements:

*Those who make effective judgments do their "homework" thoroughly before they actually make a judgment.

*It is possible to make a judgment with complete certainty.

*Once you have made a poor or wrong judgment, you are forced to live with it the rest of your life.

*Reducing uncertainty in your judgment process will in turn lead to reduced stress for yourself.

*Investigate only the obvious alternatives when making a judgment; don't waste time with those alternatives which don't come to mind immediately.

3. Ask students to relate their experiences with making judgments in their lives. Be particularly concerned with those students who are currently employed in part-time positions.
    *Ask students to identify their own style of judgment.

*Assist students in changing their styles of making judgments if it is necessary.

RESOURCES/REFERENCES (listed in order from best to least best for instructional purposes):

Arnold, John D. (1978). Make Up Your Mind: The Seven Building Blocks to Better Decisions. New York: AMACOM.

Bell, Robert, & Coplans, John. (1976). Decisions, Decisions Game Theory and You. New York: W. W. Norton & Company, Inc.

"Decision Making: Alternatives and Information," video, Barr Films, Box 5667, 3490 E. Foothill Boulevard, Pasadena, CA 91107.

"Decision Making: Outcomes and Action," video, Barr Films, Box 5667, 3490 E. Foothill Boulevard, Pasadena, CA 91107.

Bonini, Charles P. (1983). Simulation of Information and Decision Systems in the Firm. Englewood Cliffs: Prentice Hall.

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Burton, Leon H. & Woltag, Susan N. (1986). Pathways: Guidance Activities for Young Children. Menlo Park: Addison-Wesley.

Cassel, Russell Napolean. (1973). The Psychology of Decision Making. North Quincy: Christopher Publishing House.

Cooper, Joseph D. (1961). The Art of Decision-Making. Garden City: Doubleday & Company, Inc.

Collins, Barry E. & Guetzkow, Howard. (1964). A Social Psychology of Group Processes for Decision Making. New York: Wiley.

Einhorn, Hillel J., & Hogarth, Robin M. (1987). Harvard Business Review, 1, 66-70.

Fisher, Aubrey B. (1974). Small Group Decision Making: Communication and the Group Process. New York: McGraw Hill.

Fulcher, Gordon S. (1965). Common Sense Decision-Making. Evanston: Northwestern University Press.

McKean, Kevin. (1985, June 23). Decisions: Games minds play. Chicago Tribune, p. 1, 4.

Miller, David W., & Starr, Martin K. (1967). The Structure of Human Decisions. Englewood Cliffs: Prentice-Hall, Inc.

Pfeiffer, J. William and Goodstein, Leonard D., Editors. (1983). The Annual for Facilitators, Trainers and Consultants. San Diego: University Associates, Inc.

Staff. (1986, October). Part and Whole, Pryor Report, p. 12.

Strother, Deborah Burnett. (1987). (Interview with Newman Walker). The Human Dimension of Data-Based Decision Making. Phi Delta Kappan, pp. 470-473.

White, M. Interviewed by R. K. Hofstrand at Sarah Bush Lincoln Medical Center in Mattoon, Illinois in September, 1986.

"Group Decision Making," Role Play/Simulations game, Management Research Systems Publications, 2320 S. Third St. Ste. #7, Jacksonville Beach, FL 32250.

"Effective Supervisory Leadership II (ESL)", Management Research Systems Publications, 2320 S. Third St., Ste. #7, Jacksonville Beach, FL 32250, (904) 241-1721/241-1722.

"A Time To Decide, The Ethics of Life/Death Decision Making", video, United Training Media, P.O. Box 718, 6633 West Howard Street, Niles, IL 60648-9990, (800) 558-9015 in IL (312) 647-0600.

Making Decisions: You Can Learn How", filmstrip and cassettes, Sunburst Communications Room M838, 39 Washington Avenue, Pleasantville, New York 10570-9971, (800) 431-1934 from New York (800) 221-5912.

How To Make Good Decisions, Part III--Group Decision-Making", filmstrips and cassettes, Sunburst Communications Room M838, 39 Washington Avenue, Pleasantville, New York 10570-9971, (800) 431-1934 from New York (800) 221-5912.

"Decision Making", a two-day skill development module, Development Dimensions International, Development Dimensions Plaza, 1225 Washington Pike, Box 13379, Pittsburgh, PA 15243-0379 (412) 257-0600.

"Decisions", video, Bureau of Audiovisual Instruction, University of Wisconsin, 1327 University Avenue, Madison, WI 53715-2499.

"Decision Making, Values and Goals," video, Barr Films, Box 5667, 3490 E. Foothill Boulevard, Pasadena, CA 91107.

DECISION/teacher

SELF TEST ON TECHNICAL JUDGMENT

1. Which of the following statements best describes the COMPLIANT style of making judgments?
    - A. "I can just FEEL that customers are going to love this pattern of wall paper."
    - B. "It doesn't matter what I decide; fate will decide for me."
    - C. "Sure, boss whatever you decide."
    - D. all of the above
    - E. none of the above

2. Which of the following is NOT a "type" of judgment?
    - A. Pre-determined
    - B. Routine
    - C. Impulsive
    - D. Rational
    - E. Momentous

3. A prioritizing grid
    - A. helps to choose from many alternatives.
    - B. is square in shape.
    - C. is used instead of a sequential process.
    - D. involves wishful thinking.
    - E. requires a computer.

4. The 6 steps in making a rational technical judgment are listed below. Rearrange them into the correct sequential order.

A. Select tentative judgment ______
B. List pros and cons for each alternative ______
C. Make final judgment ______
D. Define triggering situation ______
E. Identify alternatives ______
F. Test chosen judgment ______

TRUE/FALSE

5. _____ It is not necessary to finish the judgment grid if it quickly becomes apparent that there is one alternative that is being chosen more frequently over the other alternatives.

6. _____ An intuitive judgment is a judgment based on moral or ethical priciples.

7. _____ A judgment strategy is that plan of action a worker chooses for the situation which requires a judgment.

8. _____ It is not necessary to know all of the facts of the problem situation in order to make a wise judgment--know just the most important facts.

SHORT ANSWER

Briefly describe the difference between wishful and rational thinking and why it is important to know the difference between the two.

Describe one example of a "triggering situation" in a hypothetical problem situation.

ANSWERS TO INSTRUCTIONAL ACTIVITY #1:

1. Chance of wrongful arrest suit imposed upon the officer
2. Safety of the officer's partner, bystanders and private property is at stake
3. etc., answers will vary

ANSWERS TO INSTRUCTIONAL ACTIVITY #2:

1. delayed
2. impulsive
3. planned
4. fatalistic
5. compliant
6. intuitive
7. agonized
8. paralytic

ANSWERS TO INSTRUCTIONAL ACTIVITY #3:

1. E
2. B
3. A
4. D
5. C

ANSWERS TO THE POST-TEST:

1. C
2. E
3. A
4. D,E,B,A,F,C
5. F
6. F
7. T
8. F

9. wishful thinking: based on personal desires
   rational thinking: giving careful consideration to all pertinent factors.

10. Sales are down at the clothing store that you manage. You have to judge what strategy to employ: add a different line of clothing, drop a line of clothing that you are currently showing, use more advertising, keep your store open later at night, etc.

TRANSPARENCY MASTER

JUDGMENT GRID

____	#1	1 2	1 3	1 4	1 5	1 6	1 7	1 8	1 9	1 10
____	#2		2 3	2 4	2 5	2 6	2 7	2 8	2 9	2 10
____	#3			3 4	3 5	3 6	3 7	3 8	3 9	3 10
____	#4				4 5	4 6	4 7	4 8	4 9	4 10
____	#5					5 6	5 7	5 8	5 9	5 10
____	#6						6 7	6 8	6 9	6 10
____	#7							7 8	7 9	7 10
____	#8								8 9	8 10
____	#9									9 10
____	#10									